SCIENTIFIC AMERICAN

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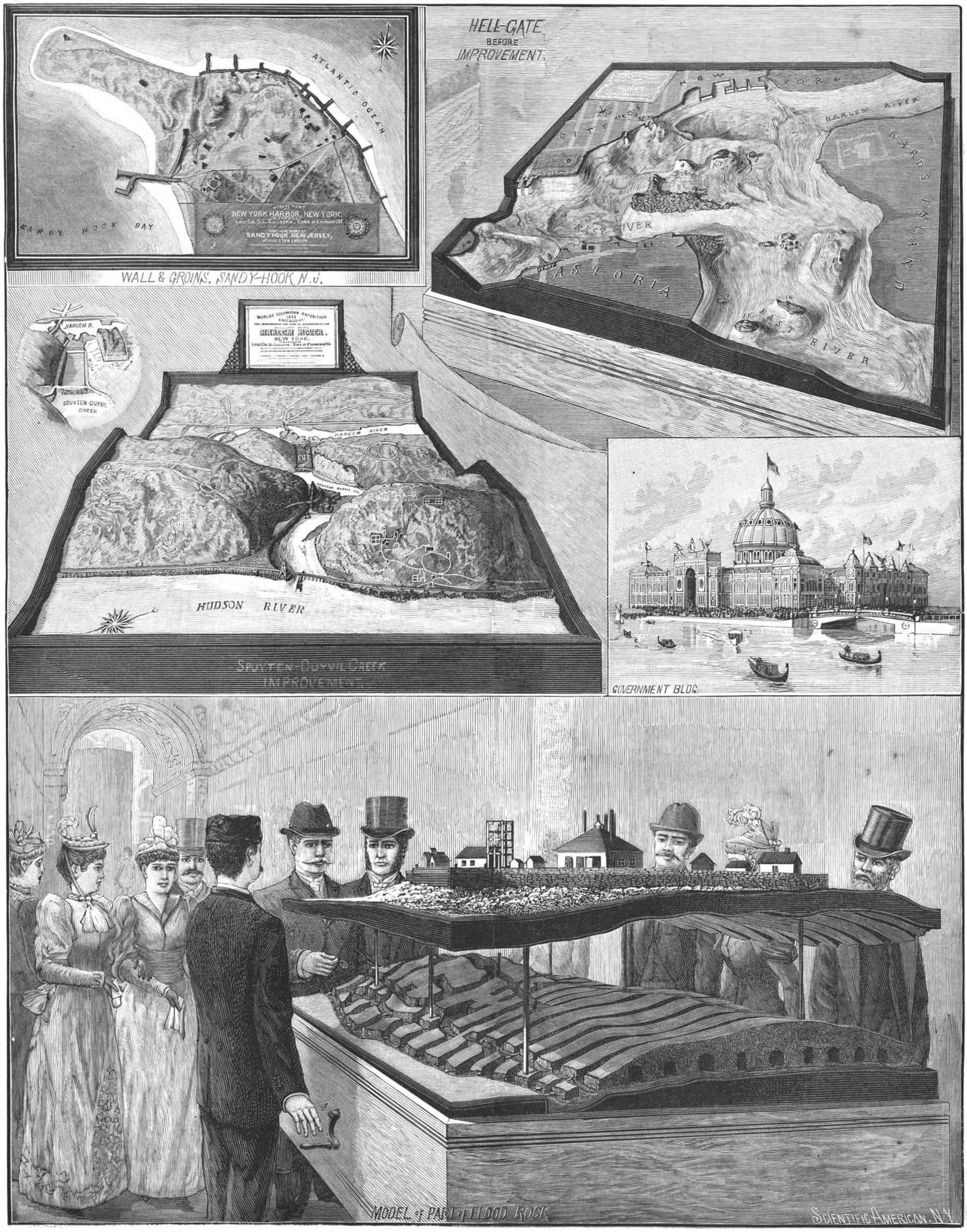

THE WORLD'S COLUMBIAN EXHIBITION—UNITED STATES GOVERNMENT EXHIBITS OF RIVER AND HARBOR IMPROVEMENTS.—[See p. 391.]

Scientific American.

ESTABLISHED 1845.

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NEW YORK, SATURDAY, JUNE 24, 1893.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 912.

For the Week Ending June 24, 1893.

Price 10 cents. For sale by all newsdealers.

THE OLD AND THE NEW SHIPS.

On another page we publish an illustration of the recently arrived Viking ship, as she would appear in mid-ocean, speaking a modern steamer. The picturesque little craft, of model which has been pronounced almost perfect, with her gayly striped sail, decorated stem and stern posts, and her rows of shields on either side, is seen driving before the wind toward her port. Back of her looms up the giant form of a modern steamer, bringing together the naval architecture of to-day and that of ten centuries ago. The crossing of the ocean by this little craft adds to the probability that the Norwegians did make their way across the Atlantic Ocean in olden times, and that Columbus crossed a sea which had been traversed some five centuries before by the hardy Norsemen. The trip is one of peculiar interest. As a model for the ship the famous Gokstad ship was at hand; this was followed as closely as possible in the construction. Thus a great advantage obtained over the Spanish caravels. They had to be made up from early pictures and descriptions only, there being in existence no remains of a genuine caravel. Before leaving Norway, the Viking ship cruised about the coasts a little, and was found to be an unexceptionable model, and a trip across the ocean with a picked crew was confidently undertaken. It is in this achievement that the interest of the voyage is found. While the caravels had only been experimented with under sail, and were prosaically towed across the Atlantic from Spain, the Viking ship started at once on her long voyage without the assistance of a steam vessel to tow her and without escort or convoy of any kind. Taking advantage of favoring winds, tacking as well as possible when the winds opposed her, lying to in gales or scudding before them, she comfortably made her way across the ocean in a little over one month.

Our illustration shows vividly the difference in size between the old and the new ship. A modern vessel may be nearly as wide as the Viking ship is long; the Viking ship could be dropped end-first into one of the funnels of the Campania and be completely ensconced therein with 40 or 50 feet to spare. The modern ship driven by from 10,000 to 30,000 horse power covers every day from 400 to 530 marine miles. The Viking ship with her single sail of 200 square yards area, supplemented by a small jib, was thought to do remarkably well when she covered a little over 200 miles in a day's sailing.

In the absence of a sail the Viking ship was to be propelled by oars; the aggregate horse power which this method of propulsion would represent could not well exceed a sustained average of 3 or 4. This brings out in still more startling relief the difference between the old sea dragons, about which their poets and historians grew enthusiastic, and a modern businesslike liner, which under the impulse of thousands of horse power completes her voyage with the expenditure of a ton of coal for every four or five minutes of her progress.

Many stories are related of the ancient Viking ships which were, in many instances, little better than piratical craft. Of one of their commanders it is told that he could walk upon the shafts of the oars projecting from the sides; one ship is said to have been so large that a warrior standing on her bottom could hardly touch her beams with uplifted battle ax, yet the single chimney of a modern ship is a far greater structure than were these old themes of admiration of the northern bards. The greatest of the Viking ships would be consumed in an hour in the furnaces of an ocean steamer. The old ships were buried with their warrior commanders as a fitting coffin or sarcophagus. The modern iron ship finds her grave only in the sea if she is wrecked, our unpoetical age not thinking well of so expensive a sepulture as that which the steel ship of the day would provide.

LAUNCH OF THE BATTLE SHIP MASSACHUSETTS.

On June 10, at 10 A. M., there was launched at Cramp's shipyard, at Philadelphia, the battle ship Massachusetts. This ship is a sister to the Indiana launched last March, and to the Oregon, which is not yet afloat. In every respect the launch was a great success. Before the men had cut through her upper ways she broke loose, and two minutes before the start was anticipated she slid down the ways into the water. She was christened by Miss Herbert, the daughter of United States Secretary of the Navy Herbert. A national salute of 21 guns was fired in her honor, followed by a 17 gun salute for the Secretary of the Navy; and after speeches and inspection of the ship a quartermaster was detailed to strike the ship's bell, presented by the 7th Regiment of New York City. It is said that it was the most ceremonious launch that ever occurred at the yard.

This ship is the second of three ships of 10,200 tons burden, commenced during Secretary Tracy's *regime*. She is very heavily armored, the water line belt being 18 inches thick and extending along three-fourths of the ship's length. Turning in forward and aft around the base of the redoubts, it extends 3 feet above and 4½ feet below the water line. The turrets and redoubts are 17 inches thick. Above the belt of armor the side is protected by 5 inches of steel; one deflecting steel protective deck is provided in addition to steel decks above it, also of sufficient thickness to afford a measure of protection. Her conning tower is armed with 10 inch plates. A military mast is provided, carrying two tops for rapid-fire and machine guns. The hull is cut up by water-tight bulkheads, has protective coal bunkers, and is protected by cellulose or cofferdam from leakage if perforated.

In her armament she is of the most powerful class; at a single discharge she will be able to throw 6,800 pounds of projectiles. Her battery is to include four 13 inch rifles, eight 8 inch rifles, and four 6 inch rifles as the main armament in addition to her secondary battery of light rapid-fire pieces. She is to carry six torpedo tubes, one at the bow, one on the stern and two on each side, for 18 inch Whitehead torpedoes. She is to develop a horse power of 9,000 and a speed of 15 knots. She is the second of the three ships built by the Cramps. The third ship, the Oregon, was assigned to the Union Iron Works, of San Francisco. The contract price for the Massachusetts and the Indiana was $3,020,000 apiece; for the Oregon the bid was $3,180,000.

The Relation of Photography to Art.

M. Robert de la Sizeranon has an excellent article on the subject, "Relation of Photography to Art" in the mid-February number of the *Revue des Deux Mondes*, translated into *The Review of Reviews*. He dwells, first, on the service photography has rendered to painters in enabling them to study correctness of detail. The conventional landscapes, the complicated architectural backgrounds, the "ideal" and impossible forms of men and horses, have all disappeared. The whole art of "historic landscape" has been relegated to the Valley of Lost Lumber. In perspective, photography has made it possible for us to appreciate more accurately the size of figures in different planes. Most painters before the rise of photography will be found to have given too much importance to the figures of their background or middle distances, relatively to those of the foreground—a mistake frequently made by amateurs in landscapes. Photography has also simplfied, to an astonishing degree, the production of panoramas. After noting the influence of photographs of distant countries in interfering with the production of fancy tropical landscapes and imaginary Eastern scenes, and the revolution it has brought about in the art of portraiture, M. de la Sizeranon goes on to discuss what may be expected of photography in the future. He devotes several pages to the discussion of Mr. Muybridge's instantaneous photographs of horses and other animals in rapid motion, and inquires whether we are to accept the often extremely ugly and awkward poses shown in them as nearer reality than what the ordinary eye supposes itself to see. He thinks not—rather that the modern picture is a violent exaggeration; for it presents to us, immovably fixed, a position in which the animal only remained for so incalculably minute a fraction of a second that to the eye it blended with the position immediately following it, and so formed part of a harmonious motion. Every movement consists of a succession of poses, each lasting so infinitesimally short a time that we see none of them separately. What we do see (when the motion is not too quick to let us see anything distinctly) is a generalized representation of the whole, a kind of composite photograph, so to speak; and an approximate picture of this is nearer the truth than any number of instantaneous photographs of separate poses. It is, however, a distinct gain that the classic charger at full gallop, with all four legs extended in the air at once, who never existed on earth save in battle pictures, should finally have been hunted and driven from the field, as Mr. Muybridge has had some share in doing.

Photography is growing more perfect every day; even the great color problem seems to be as good as solved at last. M. Lippman has succeeded in producing several very successful photographs in colors, by availing himself of the laws of interference of light. Last spring, at the International Exhibition of Photography at Paris, he exhibited a picture of an Ara parrot (blue and yellow), and a branch of holly; at a later date he succeeded in producing a stained glass window in four colors, a group of flags, a plate of oranges with a red poppy, thus almost completing the chromatic scale. He uses a mirror, a film of gelatino-bromure, and a little mercury.

It may be said that, since this last step has been taken, photography leaves nothing for the painter to do. If it were true that the only object of art is the mathematically accurate reproduction of the world around us, this argument would be unanswerable, and the "realist" school, who maintain this position, are beginning to find that they have no *raison d'être* whatever. There remains, then, nothing for artists to do but turn their attention to those (of late somewhat neglected) regions which the camera cannot reach; and we may consequently expect a new development of imagination and idealistic art.

The crowning feature in the Electrical Palace is the Tower of Light, a memorial to Mr. Edison and to his inventions, which have so perfected electric illumination. Every evening that the Exposition is open this tower is illuminated, and the fascination of watching it keeps a crowd of people constantly in the building. The colors change from one to another, chasing each other up the shaft, dazzling the eyes with its brilliancy. The tower is 82 feet high and is studded with six candle power lamps to the number of five thousand.

The Bell Telephone exhibit is a study, as in this pavilion is shown a full set of the models that were made by Mr. Bell, thus giving in complete detail the gradual development of this instrument. In addition to all these models are many of the latest improved telephones, and across one side of the pavilion is a model telephone exchange which is the "central" of the Exposition grounds. This exhibit is crowded at all times by people watching the young women make the connections on the switchboard.

Adjoining the Bell Telephone pavilion is the exhibit of the Western Electric Company, which is very complete and contains several features which have been revelations to the public as to what electricity can do in the way of lighting. The chief feature of this exhibit is a pavilion of Egyptian architecture, which is illuminated in the interior to show the soft and perfect results that can be obtained with electric light, and to at the same time display many of the smaller manufactures of this company. Adjoining this structure is the Tower of Lightning, as it is frequently called. This is a shaft studded with over 2,000 incandescent lamps, red, white and blue, which wind around the shaft from its base to the ceiling of the gallery above. From the top four lines of lamps containing the three colors branch out in different directions, each having a forked course like a streak of lightning. At the ends of two of these lines of light are large globes, also studded with colored incandescent lamps, while at the other two ends are clusters of lamps. The light begins at the bottom of the shaft, ascends with much rapidity to the top, splits into the four sections running along the rows of lamps over the zigzag course to the ends. When the light reaches the globes and clusters it becomes white, changes in an instant to red, then to blue. The instant the light disappears from these ends it begins again at the base of the shaft. The fascination of this exhibit is quite irresistible, especially as the automatic revolving switch, which controls the electrical current, is open to view by means of an open well, the switch being under the floor. There is nothing complicated or elaborate about this switch, and the majority of visitors who study it for a minute go away feeling quite content with themselves that they have for once comprehended the manner in which electricity is controlled. Another exhibit by the Western Electric Company is the electric finger, which writes, and as it writes illuminates, a series of letters spelling out, letter for letter, "W. E. Co.," in colored lamps.

The General Electric Company occupies by far the largest amount of space in this building, and makes a complete exhibit of dynamos of all kinds and motors which will be intensely interesting to students in electricity because of the advancement shown by the many models of early types of these machines. Either in this or in other exhibits are models of nearly all of the types of dynamos that have been made since the old Farmer dynamo, which is exhibited by the Ansonia Electric Company in the north gallery. An attractive feature of the General Electric and other exhibits is that of arc lamp poles, many of which are very artistic in design, and which give hope that the time is not far distant when the ungainly-looking poles now seen so frequently in use for street lighting purposes will give way to something more artistic. In this same exhibit is shown the development of the incandescent lamp, beginning with the very earliest experiments of Mr. Edison and ending with an infinite variety of these lamps as now made. This includes miniature lamps in every conceivable shape and design, and lamps of all candle powers from a mere speck of light to 250 candle power.

The Westinghouse Electric and Manufacturing Company occupies a large space and exhibits a complete line of machines, lamps, and other electrical apparatus and devices. The pavilion occupied by this company is one of the most attractive ones in the building. It is decidedly artistic in design, is colored with rare taste, and, when illuminated in the evening, presents a beautiful effect. But to the average electrical man the main interest in the exhibit of this company will be in the display of dynamos made in the power plant in the Palace of Mechanic Arts. This exhibit includes six dynamos of a maximum capacity of 15,000 lamps each, three of which are direct-connected as has before been described in these columns. The switchboard which controls this incandescent lighting plant is a piece of workmanship both in effective design and in electrical conception that has probably never been equaled because of the enormous capacity of the plant.

The exhibit in the Palace of Mining that attracts the most attention is probably that of the De Beer's Consolidated Diamond Mines, Kimberley, South Africa, This exhibit faces the central aisle and is in the southern end of the building. At stated times each day, and usually for a period of two hours, of which notice is given beforehand, the process of diamond washing is fully shown. Tons of diamondiferous ground have been brought from the mines of this company, and each day part of this ground is crushed and washed and the work carried on in the same manner, though not on the same scale, that it is done in the mines themselves. The pavilion containing this exhibit is mostly of glass, so that the whole operation can be fully observed. In the end of the pavilion facing the central aisle, Tiffany & Co. of New York have several men at work cutting and polishing the stones, and there is a constant crowd of people watching this operation. In one corner of the pavilion is quite a pile of ground showing the diamonds in the matrix and the diamondiferous ground. There is also a fine exhibit of diamonds cut and uncut. The largest uncut diamond that is shown weighs 282 carats. The mineral exhibit of the Cape Colonies is immediately back of this diamond exhibit. In this exhibit there is also shown considerable diamondiferous ground together with coal, copper, and other minerals from these colonies. The display of crocodolite is particularly fine. This beautiful mineral is wrought into charms and ornaments in great variety, also into knife handles, medallions, etc.

In the Oregon display is another exhibit that attracts much attention. It includes a working model of a gold placer mining outfit. A large amount of gold-bearing dirt is at hand for demonstrating the whole process of panning out the gold and at stated intervals the plant is put into operation. This exhibit is not surrounded with glass, and it is an amusing sight to see people hunting over the sand and dirt for particles or appearances of gold.

The latest achievements in the construction of railway rolling stock for passenger service in Europe and in North America are fully shown by an exhibit which stands nearly in the center of the annex to the Transportation building. Here are two trains of cars with engine attached. One is exhibited by the London and Northwestern Railway, the other by the Canadian Pacific. The engine attached to the English train is the Queen-Empress, and it has a record for high speed. It is a compound engine of the Webb type, the one low pressure cylinder being in the saddle and the two high pressure cylinders being on the outside, located as usual on engines. This engine has a pair of drivers on each side 7 feet 1 inch in diameter. It is severely plain and much resembles in effect the type of engine illustrated on the front page of the SCIENTIFIC AMERICAN of May 27. Two cars are shown with this engine. One is a compartment car of the English type, the other is a sleeping saloon. These cars are finished in dark blue on the exterior, while the interior of the several compartments is finished in different colors and qualities of material, according to the class. The doors to the cars are open, so that sight-seers can look in, but people are barred from entering the cars.

On the track adjoining the one on which this English train is shown is the train exhibited by the Canadian Pacific Railway. This consists of engine No. 625 and a train of five vestibuled cars. The engine is a monster weighing 213,000 pounds and having three coupled drivers, each 69 inches in diameter, on each side. The engine and cars were constructed in the shops of this company The cars are heated by steam and lighted by electricity. The exterior finish of each car is of highly polished mahogany. Immediately back of the engine is the baggage car, next comes the second-class car, upholstered in leather and finely finished in natural wood. In arrangement it is like an ordinary sleeper and it is fitted with smoking compartment, lavatory, etc. The third car is a day coach finished in white mahogany and plush of copper red, while the smoking room is finished in old oak and olive corduroy. Then follows the dining car, fitted with tables for four people on one side of the aisle and for two people on the other side. This car is finished in white mahogany and old oak and upholstered in leather. The last car on the train is a sleeper finished in white mahogany, bronze metal work and paneled ceilings; the upholstery is sage green plush. In addition to the berths there are two state rooms, a bath room and a large smoking room, together with the other usual accommodations.

Nothing can be much more instructive in the Transportation building than these two exhibits which stand side by side. They need not call out comparisons, because of the entire difference of the service for which each was designed. The English train runs on as perfect a roadbed as can be made, is designed to make high speed and has no sharp curves to turn. The Canadian Pacific train has a much less perfect roadbed, is designed to make the trip across the continent from ocean to ocean if need be. It must make sharp curves and the engine must have capacity to haul this train up any grade and at the same time be able to make long runs at a speed of 60 miles an hour without overstraining. This train is open to the public inspection.

June 13 was the last day spent by the Infanta in Chicago. During it she visited the Fair, and her visit thereto was signalized very appropriately by the dedication of the Spanish building in her presence, and on the same day the Spanish exhibit in the Manufacturing building was formally opened to the public. On June 14 a special train left Chicago for New York, carrying the Infanta and her suite. It made a run of 514 miles in a fraction under 11 hours, maintaining a speed, exclusive of stops, of 50 miles an hour, a very remarkable achievement for so long a distance. Another interesting incident connected with her visit was the attention bestowed by her on E. D. Libbey, the proprietor of the Libbey Glass Works, who is said to have been made official glass cutter by the Infanta. On the same day, at 5 40 P. M., the great cowboy race was started from Chagron, Nebraska. At the pistol shot, and witnessed by a thousand people, nine riders started on the long race, the World's Fair being the terminal point. They are to complete the ride, each man on the same horse, and a prize of $3,000 is to be given to the winner. In addition a special prize for bringing their horses through in good condition is included for the riders.

On June 14 Signor V. Zeggio, the Royal Italian Commissioner for Liberal Arts, formally opened his section. The magnificent exhibit of jewels of Tiffany & Co. was opened the same day. It includes the two largest yellow diamonds in the United States, in addition to the very remarkable strings of pearls and other mineral objects which were seen and admired by so many people in this city before the exhibit left.

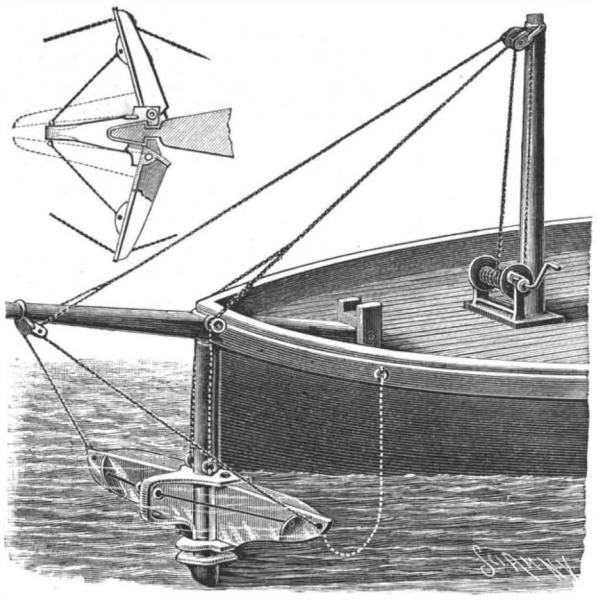
The great Ferris Wheel is now rapidly approaching completion, and is to be opened on the 22d. It has cost about $250,000, and it is hoped that it will be as great a success in its way as was the Eiffel Tower in Paris. On June 15 the Fair had what was, up to the present period, its greatest day. The dedication of the Indiana and Arkansas State buildings and the opening of the interesting Java Village took place on that day, but while these would have been enough to signalize an ordinary day, they were minor matters compared with the German celebration. The day was termed the German day, and from all sides the railroads unloaded great crowds of representatives of the German nation, and the crowds poured into the park in such numbers that there was difficulty in getting them in fast enough. The German government building was, of course, the center of attraction, and next to this came the Midway Plaisance. Speeches, music, an immense procession, and gymnastic exhibitions by the Turner societies were among the special features of the occasion. At last all the witnesses seem to have settled on the conviction that the Fair for one day proved itself an absolute success. Hitherto there has been a tendency to criticise the management and to be very severe on anything partaking of an unfavorable aspect; but on Wednesday the Fair seems to have redeemed itself in the eyes of all, and it now looks as if, with large attendance and reduced expenses, the Fair might be made, comparatively speaking, a financial success.

Its expenses so far have been very heavy; the salary list for May reaching the total of $850,000, divided among 6,000 employes. This is recognized as far too great, and the Director of Works, it is announced, has decided to drop 3,000 men from the pay rolls. The attendance is rapidly increasing, and it looks as if the daily average would soon be 100,000. On Wednesday naturally the largest attendance took place, aggregating nearly 200,000 paid admissions, and a total attendance of about that number. Some interesting comparisons with the attendance at the Centennial Exposition at Philadelphia have been made. During May, 1876, the average attendance of the Centennial Exposition was 19,945 per day; at Chicago during May, 1893, the attendance was 36,060. At Philadelphia the attendance for June and July was nearly identical; August showed an increase of nearly fifty per cent, while September and October showed an immense increase, the total attendance aggregating over three times that for the months of June and July. For November there was of course a large falling off. It follows that for Chicago everything is to be hoped in the future three months. The arrangement of concessions in Chicago has been admirably conceived. From them

an enormous sum will be received by the Fair managers to be devoted to the expenses of the Exposition. It is impossible, therefore, to say whether or not the Exposition will pay expenses, but it seems a very safe prediction that from a proper point of view it will be far from a failure. It has been calculated that any attendance over a daily average of 100,000 will represent the profits of the Exposition, and there is every reason to believe that such an attendance may be realized.

A VESSEL STOPPING DEVICE.

The illustration represents an improvement designed to facilitate the quick stopping of a vessel moving in dangerous places, or in danger of colliding with another vessel, an iceberg, etc. The invention has been patented by Mr. Pedro Samohod, Nazarenas 145, Lima, Peru. A vertically sliding frame on a post at the bow of the



SAMOHOD'S VESSEL STOPPING DEVICE.

vessel has on its sides pivoted wings adapted to expand transversely to offer resistance to the forward motion of the vessel in the water when the frame is in its lowermost position. The wings are held in extended position by means of chains attached to a forward projection of the frame, and, to prevent accidental closing, other chains connect the free ends of the wings with the sides of the vessel. The frame is raised and lowered by chains or ropes leading upward over pulleys on the bowsprit to a common chain passing over a sheave on the mast and thence to a winch on the deck. To close the wings, chains connected to their outer ends pass over sheaves near the outer end of the bowsprit, thence to a common chain passing over a sheave on the mast and to the winch, the operation of which closes the wings, as indicated by dotted lines in the small figure, simultaneously with the raising of the frame and its wings out of the water. The winch is preferably provided with a locking mechanism under control of the officer in charge, on the bridge or other place, so that the frame may be quickly released, the chains rapidly unwinding as the frame drops to place of its own weight, the wings at the same time spreading out.

EXPOSITION AT LYONS, FRANCE, IN 1894.

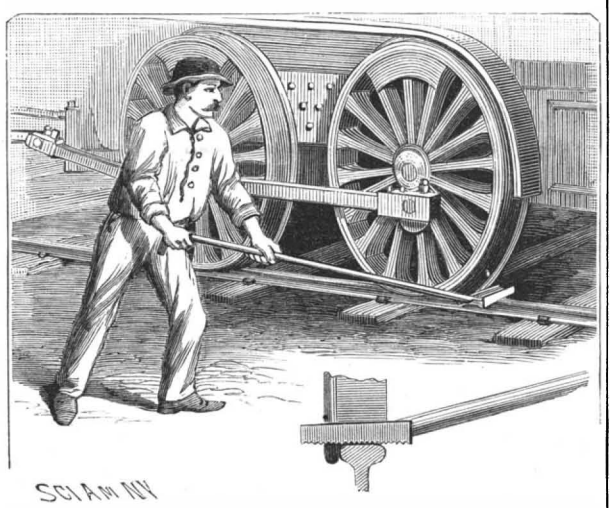
Arrangements are being rapidly pushed forward for holding an Exposition at Lyons next year. The fair is to be opened on April 26, 1894, and the accompanying engraving, issued by the official bulletin of the Exposition, shows the plans for the principal building. It is to be polygonal in shape, with a lofty central dome which will rise to a height upon the interior of some 180 feet. It rises in a graceful curve, the structure being strengthened by means of the airy lateral supports which resemble the flying buttress of a Gothic cathedral. The work is being carried on from designs of Messrs. Claret & Grenier, the engineers in charge. The building will be 760 feet in diameter, and will cover a space of nearly 500,000 square feet. The total weight of the entire structure will be only about 2,480 tons.

Economies Wrought by Chemistry.

Chemists turn scrap iron into ink, old bones into lucifer matches, the shavings of the blacksmith's shop into Prussian blue, fusel oil into oil of apples and pears, the drainings of cow houses into fashionable perfumery, beggars' rags into new pilot coats, cesspool filth into ammonia, and tar waste into aniline dyes and saccharine. In Paris they first utilize rats to clear the flesh from the bones of carcasses, then kill the rats, use up their fur for trimmings, their skin for gloves, their thigh bones for tooth picks, and their tendons and bones for gelatine wrappers. These are a few of the things *Iron Industrial Gazette* names among the products converted into use by the chemist and inventor.

AN IMPROVED PINCH BAR.

This bar is especially adapted for moving locomotives and railway cars, or for turning a wheel thereof, when there is no other power convenient, its construction being such that it may be conveniently used when at right angles to the track and wheel, the bar being made to pinch upon the flange and not upon the tread of the wheel. The improvement has been patented by Mr. John McDonald, of Tokio, Japan (Railway *Shinbasi*). As more distinctly shown in the side view, representing the bar applied to a rail and wheel, the foot is practically rectangular in cross section, and both its upper and lower surfaces are dished to produce central longitudinal depressions, with knife-like side edges on the top, while the under side edges form flat side ribs, which may be smooth or roughened, or have serrations or teeth produced in them. The upper

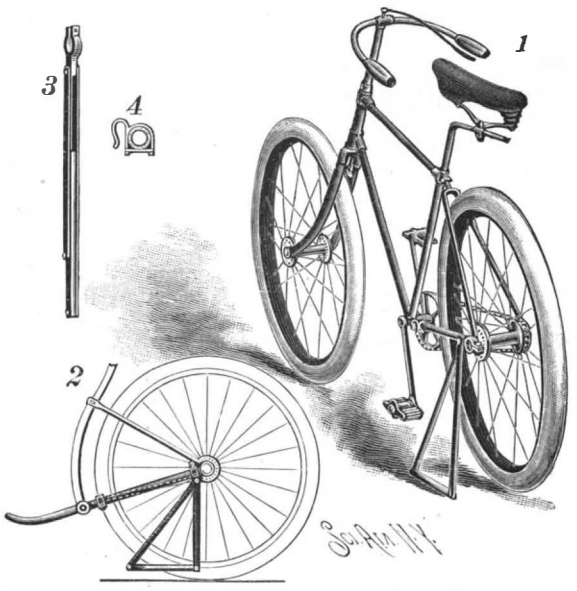


McDONALD'S PINCH BAR.

knife edges engage with the flange of the wheel, and the ribs rest transversely on the tread of the rail. The handle is bent downward at its outer end, forming a protection for the hands in case the bar should slip, and also has a ring, by which the bar may be hung up. The bar may be quickly and conveniently manipulated, and is designed to afford a much more powerful leverage than that obtainable with the old form of bar.

A CONVENIENT BICYCLE STAND.

The illustration shows a very cheap and convenient stand, readily applied to any bicycle, which may be carried about without inconvenience, and at any time dropped into position to sustain the wheel without compelling the rider to hunt around for a fence or other support. It has been patented by Mr. Clayton J. Whipple, Nos. 270 and 272 Wabash Avenue, Chicago, Ill. Fig. 1 shows the stand in open position attached to a man's bicycle, Fig. 2 showing its application to a woman's wheel, and Fig. 3 being an edge view of it in collapsed position. It has two swinging side pieces, one longer than the other, and at their upper ends is pivoted a clamp with a socket to receive the axle or step of the rear wheel of the bicycle, or to receive the side bar of the frame, the clamp being made fast by a screw or bolt. The base of the stand consists of a flat slotted rod pivoted at the lower end

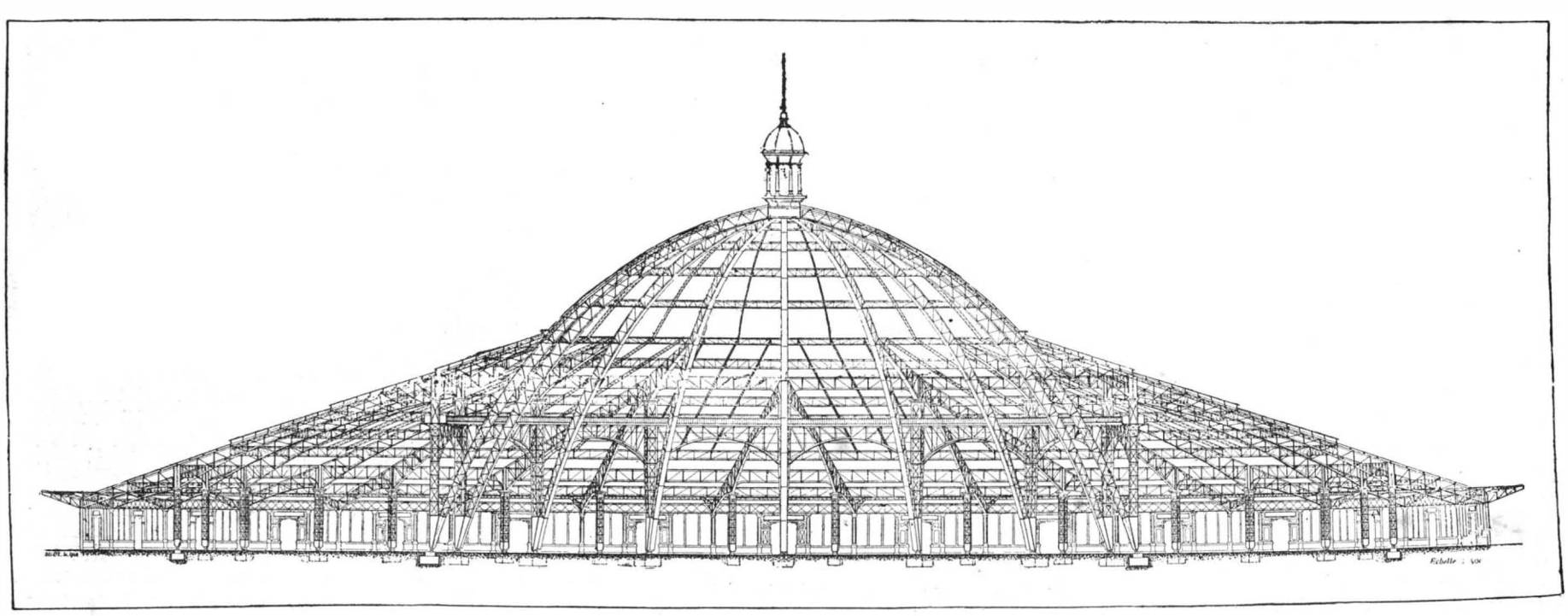


WHIPPLE'S SAFETY BICYCLE STAND.

of one side piece, a pivot pin on the lower end of the other side piece passing through the slot, so that the three pieces fold together in parallel position, and when open assume a triangular shape, giving great strength in proportion to its weight. When applied to a man's bicycle, and swung up into folded position parallel with the side bar of the frame, it may be thus retained by any suitable fastening device, a simple form of clip for such purpose being shown in Fig. 4. When the stand is released from the catch and dropped down it opens of itself, allowing the bicycle to lean slightly upon it, but forming a secure support therefor. For a woman's wheel the clamp is preferably applied to the side bar of the frame adjacent to the rear axle, as it is not convenient to secure the clamp to the axle.

Steel Rails Very Cheap.

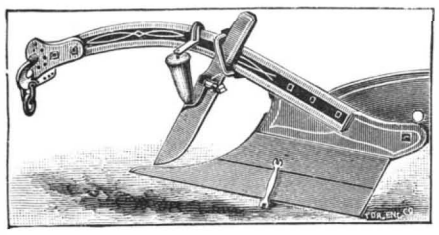
Mr. Andrew Carnegie says: "The robber baron has ceased to rob, and is now being robbed. The eighth wonder of the world is this—two pounds of ironstone purchased on the shores of Lake Superior and transported to Pittsburg, two pounds of coal mined in Connellsville and manufactured into one and one-quarter pounds of coke and brought to Pittsburg, one-half pound of limestone mined east of the Alleghenies and brought to Pittsburg, a little manganese ore, mined in Virginia and brought to Pittsburg, and these four and one-half pounds of material manufactured into one pound of solid steel and sold for one cent."



THE FRENCH UNIVERSAL INTERNATIONAL AND COLONIAL EXPOSITION AT LYONS, 1894.

PETCH'S PLOW ATTACHMENT.

The device illustrated in the accompanying cut is intended to prevent injury to such crops as turnips, carrots, beets, etc., when the fields are being plowed. It consists of a clearing roller, designed to be attached to the colter or cutter blade of an ordinary plow and mounted at an angle thereto and in front of the cutter, so that as the plow passes through the surface of the ground the roller will push to one side any bulbous roots that may be met with, and will prevent their being injured by coming in contact with the cutter blade when the field is being plowed up. The roller also serves to turn over the ground as the plow passes over it, and it also serves to prevent foreign material from collecting and clogging the colter.



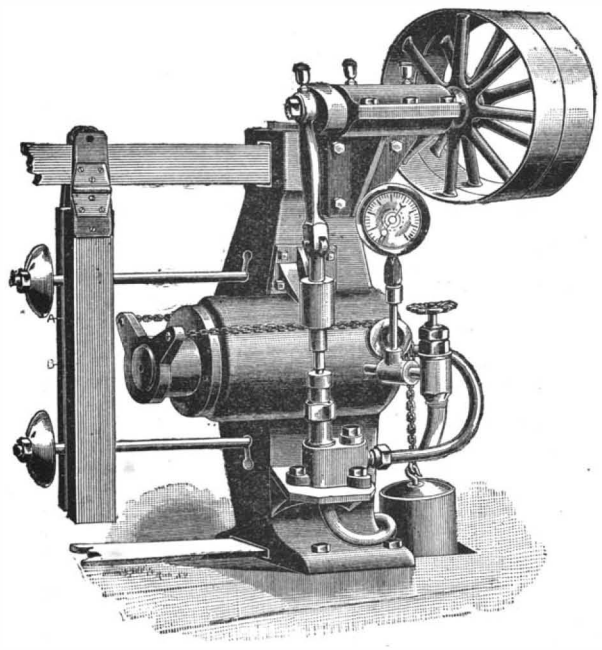
PETCH'S PLOW ATTACHMENT.

Mr. Arthur John Petch, of Aurora, Ontario, Canada, who is the patentee of this attachment, makes the roller preferably conical in shape with the largest part at the top, and it is mounted upon a spindle, upon which it rotates freely. It is attached to the plow by means of two brackets, one of which is bolted to the beam of the plow and the other to the cutter blade. It is freely adjustable thereon, and may be attached to any form of plow.

AN IMPROVED HYDRAULIC WHEEL PRESS.

The illustration represents the head end of a single pump hydraulic car wheel press. The bars, A and B, together with the heavy bolts passing between them and extending through the cylinder arms of the machine, are used only by electric railway companies for pulling pinions and gears. They will resist 30 tons pressure. The parts of the machine not here illustrated consist of a traveling crane or saddle having adjustable hooks for holding shaft or axle, a suitable yoke (abutment beam) which is suspended on rollers so as to be easily moved back and forth, also a foot piece having a side opening at its center so as to admit of placing a long shaft in the machine by allowing it to extend beyond the foot piece. This machine is manufactured by the J. T. Schaffer Manufacturing Co., Rochester, N. Y., and is used for removing and pressing on car wheels and engine drive wheels, also for general use in machine repair shops where great pressure is required.

It can be operated either by hand or belt power, is made in various sizes for swinging wheels from 36 inch to 84 inch in diameter and for generating from 30 to 300 tons pressure. The larger machines are constructed with double pump. The rams of the various sizes of this machine are of standard diameter and length for



HYDRAULIC CAR WHEEL PRESS.

the requirements of each. The valves of the improved Schaffer hydraulic pump, used exclusively by this company, are easily opened. The crank shaft is steel and has a long bearing in Babbitt metal. This shaft is placed at right angle or parallel with the line of the machine to suit the purchaser. This company makes all its own fittings; they are extra heavy, and the workmanship and materials throughout are first class. The packings in pump and cylinder are such as to prevent leakage, are very durable and easily renewed. The lower tension bar being flatwise materially stiffens the line of pressure, also reduces the distance of raising wheels by about 4 inches.

Each machine has a standard gauge, safety coupling, and sealed water tank. As accompanying appliances to this machine (or which may be adjusted to other similar machines) this company has recently put on the market a car axle straightener which it is said can be put in position in less than one minute, and is claimed to be a very satisfactory device. It is also equally desirable for straightening shafts, or to use as a rail bender. The same company is also having a large demand for another device for street car repair shops, to be used on any hydraulic wheel press for removing old car wheels from the axle, on which a large gear is located near the wheel.

An Elevated Railway in Naples.

A remarkable scheme has been laid before the Syndic and Town Council of Naples for the construction of an elevated railway in that town, and a concession for carrying it out has recently been granted. The project is due to Signor Adolfo Avena. The railway will place the handsome and populous center of the town near to the Via Roma—in fact, the center of Neapolitan life and business—in communication with the Corso Vittorio Emmanuele, the San Martino Hill, and the elevated part of the town known as the new Rione del Vomero. The line will be carried on two metallic viaducts, one arranged at a higher level than the other and each having a double way. Each passage will be independent of the other, one forming a course for electric cars and the other being reserved exclusively for foot passengers. The first viaduct, of a length of 1,180 feet, will commence in a masonry tower 325 feet high, in the Via Roma, opposite the Via S. Brigida, and will terminate in the base of a second metallic tower 490 feet high, to be built in the Cariati Gardens in the Corso Vittorio Emmanuele. The second viaduct, starting out of this metallic tower a certain distance below its summit, will pass over the San Martino Hill and terminate on the level at the new Rione del Vomero. Thus the metallic tower will form the connecting link between the two viaducts, which will be carried on eleven pyramidical metal columns or towers having masonry foundations. The electric cars, after running along either viaduct, will be automatically placed upon the lifts for hoisting or lowering passengers, who, having once taken a seat in the car at one of the termini, will be conveyed to the other end of the line in eight minutes without the necessity of changing seats.

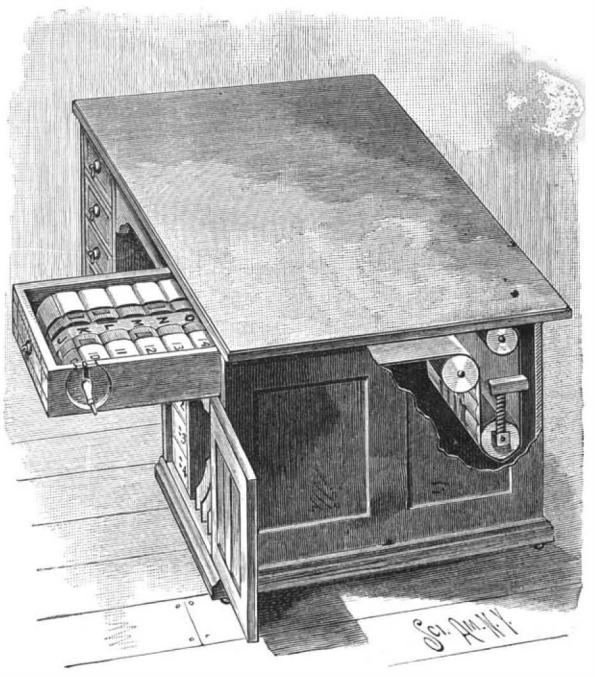
Chicago Enterprise.

Frequent instances, says the *Railway Review*, of what can be done on occasion have been recorded concerning Chicago, many of which entitle the city to pre-eminence, but one of the most remarkable exhibitions of energy was brought to completion early in the present month, when the largest grain elevator in the world, having a storage capacity of 3,680,000 bushels, was commenced on April 1 and finished and commenced business on May 3, a period of thirty-three days; having within one week from that time more than one million bushels of wheat in store. More than eight million feet of lumber were used in the construction of the building, which is of the ordinary crib style. The elevator is equipped throughout with electric lights and is completely furnished with all styles of modern machinery. From six to nine hundred men were continuously employed night and day in its construction. If any one knows of a quicker job, we should like to have it reported.

NEFF'S DESK ATTACHMENT.

Mr. John Wesley Neff, of Buckhannon, West Virginia, is the patentee of an improved form of library or office desk. It will be found of special convenience to those who have large numbers of papers or documents to be filed away, as they may be assorted and laid aside according to any convenient system of classification. A large number of papers may thus be preserved in a remarkably small space, as much of the room occupied is that located at the back of the desk, which is ordinarily wasted.

The desk may be made of any approved form of construction, the attachment being represented in the cut, which was prepared from a photograph, as applied to an ordinary business desk. The paper holder consists of an endless belt or apron which is provided with a double series of pockets opening toward each other and closed at the top and bottom so as to prevent the contents from falling out. The apron is preferably mounted in a sliding compartment or drawer and passes over rollers as shown in the cut. The two end rollers are polygonal in shape, the faces being equal in breadth to the width of the pockets, and they are corrugated so as to take hold of the apron when the actuating roller is rotated. The lower roller at the rear of the desk is spring-actuated, so as to take up the slack in the apron and so as to accommodate itself to the movement of the apron when the drawer is opened and closed. The apron is operated by means of a hinged crank handle which is located in an inset in the side of the drawer, and by means of which the upper polygonal roller is rotated. This crank handle is preferably located at the inner side of the drawer adjacent to the person seated at the desk. The top board of the desk may be hinged at the front side so that the back may be raised in case an inclined plane is preferred to write upon. A small drawer is sometimes located at the rear of the desk and under the lower roller to receive any papers that might accidentally be dislodged and fall from the pockets in the



NEFF'S DESK ATTACHMENT.

apron above. By means of this simple construction it will be seen that all the pockets may successively be brought into view.

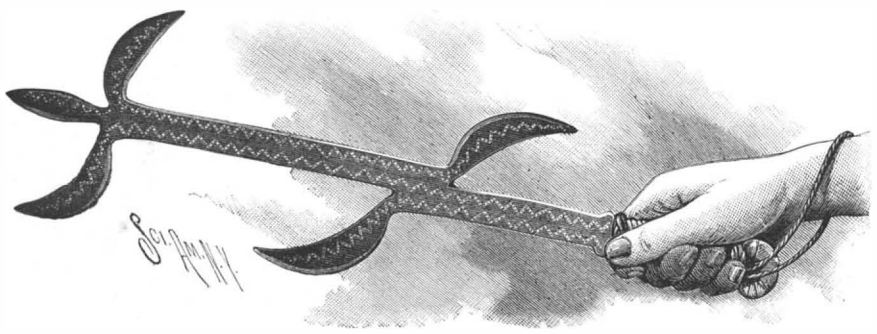
AN IMPROVED ROAD GATE.

This is a gate which may be conveniently opened and closed from either side by persons on horseback or in vehicles, without alighting. The improvement has been patented by Mr. John H. Williams, of St. Vincent, Ky. The gate is pivotally connected by a link with a weighted lever fulcrumed on a pivot turning in a plate on the ground, at a little distance from the hinge post. The lever is also pivotally connected by an arm with two diverging chains or ropes connected with the ends of beams extending in opposite directions in line with the roadway, these beams being fulcrumed near the upper ends of posts at the side of the road on each side of the gate. From the outer ends of the beams hang ropes, to be drawn upon by the traveler on horseback, in a vehicle, or afoot, to open the gate, an upward pull on the arm connected with the diverging chains giving an outward swinging motion to the weighted lever, and the latter, as it passes the central vertical position, swinging the gate fully open, so that it rests against one of the posts at the side of the road. The arm connecting the weighted lever with the pull chains is also connected by links with the inner end of a latch bolt whose outer end is adapted to engage or disengage a keeper on the latch post, a spring on the gate assisting to throw the bolt as the gate is closed. The connection is such that the latch bolt is drawn at the commencement of the movement of the weighted lever, permitting the gate to swing freely open, and, after the traveler has passed through the open gate, a pull on the second rope causes an inverse movement of the weighted lever to shut the gate, at the same time moving the bolt outward to engage the keeper on the latch post. The weight on the free end of the weighted lever is adjustably held in desired place by a set screw, and in operation either rope is pulled only sufficiently, in opening or closing the gate, to swing the lever past its vertical position, the weight of the lever then causing the completion of the inward and outward movement of the gate.

WILLIAMS' ROAD GATE.

A NUBIAN KNIFE.

One of the most interesting sights in the Midway Plaisance of the World's Columbian Exposition at Chicago is the Cairo street, which is situated near the Ferris wheel. The street is very popular, and, as the admission is only ten cents, it enjoys rather more patronage than its neighbors which charge twenty-five cents. The street is extremely picturesque, the houses being tall and the windows having carved wood screens in front. A lofty minaret towers above them all. The brick-paved street teems with life and Copts, Cairenes, Nubians and Soudanese jostle each other in their anxiety to let their donkeys and camels. Egyptian women with their faces partly covered enact the part of flower maidens and attempt to dispose of faded pinks at fabulous prices. Under the houses are open shops in which are disposed a variety of Oriental articles which appear to meet with a ready sale. In one of these little shops the Nubian knife which we illustrate herewith was purchased.



THE COLUMBIAN EXPOSITION—A NUBIAN KNIFE.

The knife is made of steel and is nineteen inches long, and the points of the two upper blades are six inches apart. It will be noticed by reference to the cut that, whichever side or part of the knife were used, a serious wound would result. The axes of the blades are not parallel, and it would be interesting to know if there is any reason for this. The knife in the condition as sold is fairly sharp and bears fine file marks. The ornament might be described as simple barbaric dog tooth decoration. The handle is covered with leather and a twisted leather cord is provided to encircle the wrist. It is very doubtful if this weapon would prove as serviceable for actual use as a sword or dagger, but in the hands of a native skilled in its use it would probably prove very effective.

INTAGLIO EFFIGIES OF WISCONSIN.

BY T. H. LEWIS.

Besides the uncounted hundreds of mounds of earth, shaped to represent animals and other figures, which were constructed in prehistoric times in the southern part of Wisconsin, a few—very few—imitations were framed on the opposite principle. That is to say, that instead of earth being heaped up on the surface of the ground two or three feet in height, with a base shaped to resemble in outline some object of nature or art, the figure was formed by excavating a certain amount of earth, from within such a boundary line, a part of the dug-out earth being deposited around the margin of the excavation, in order to even up the irregularities of the natural surface.

INTAGLIO EFFIGY NEAR FOREST HOME CEMETERY.

The valuable explorations and surveys of the antiquities of Wisconsin made by I. A. Lapham in 1850 and 1851, which gave him the means of delineating hundreds of raised effigies, only brought to light in all some nine of the reversed kind, which for distinction may well be called *intaglio* effigies. These were all situated within 50 miles of Lake Michigan, in five localities, specified as follows:

No. 1.—A few rods east of the (old) Forest Home cemetery, about two and a half miles southwest of the mouth of the Milwaukee River, was a "lizard"-shaped excavation, at least 145 feet long, judging from his diagram.

No. 2.—On the west side of the Milwaukee River, six miles north of the center of the city, on "Indian Prairie," were four "lizard" excavations together. The largest of these was apparently some 290 feet in length; and there was another excavation a few hundred feet away nearly fifty feet long, and in shape as much like an outstretched hide as anything else.

No. 3.—On the school section, about a mile and a half southeast from the village of Pewaukee, was a "lizard" excavation about 133 feet long.

No. 4.—At Theresa, forty-three miles northwest from Milwaukee, were some curved embankments surrounding three separated ovoid or curlecue excavations that were in size from 20 to 28 feet long.

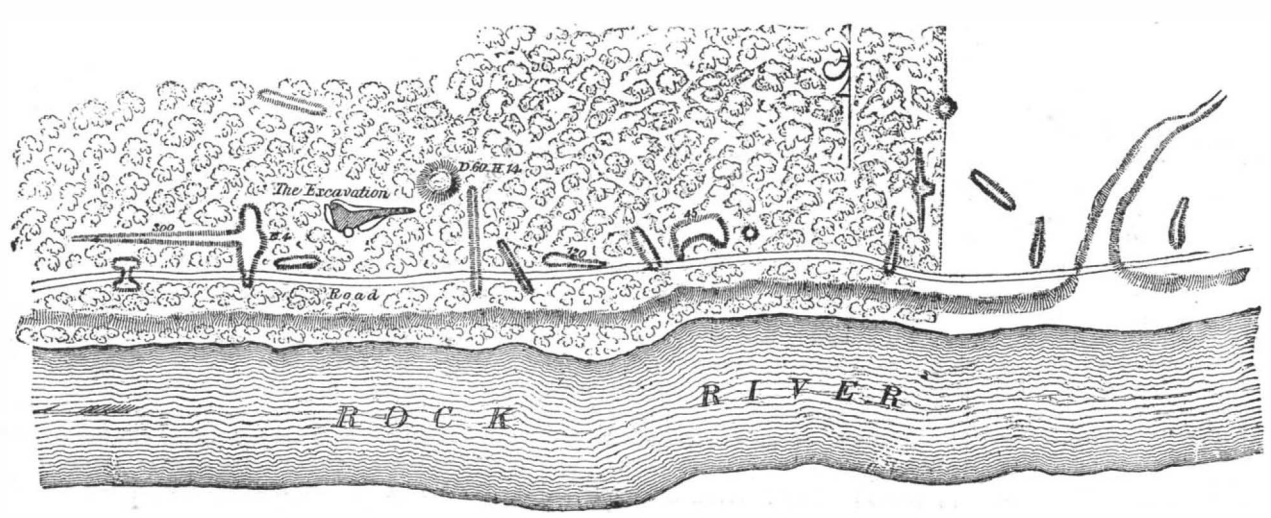
No. 5.—A little southwest of Fort Atkinson, and distant forty-eight miles west-southwest from Milwaukee, was a lizard excavation 130 feet long.

Now these are all the intaglios certainly known to have existed in Wisconsin, and with probably the exception of one locality, they no longer exist. But among them, one specimen at least is yet in good condition and fit to survey.

One day last month, during an archæological examination of the region where the intaglio referred to is situated, a careful survey of it was made, together with what remains of the mounds in the group of which it forms a part. This is the group at the locality referred to above as No. 5, near Fort Atkinson, Jefferson County. The length of this intaglio is 131 feet, and that portion of it which represents the body is two and a half feet in depth. A small portion of the earth taken from the excavation was distributed along the margin to make the immediate surrounding surface more even and symmetrical.

It may here be appropriately remarked that the term "lizard" applied by Mr. Lapham to those effigies which present head, legs, body, and an extraordinary long tail, shown in profile, should now be abandoned, for, since his time, it has been fully shown that saurians when imitated in earth are invariably in plan, as if looked down upon, never from a side view. The builders of the effigy mounds had most decided conventional methods of delineation, and this way of distinguishing reptiles from other animals was one of them.

It would be an interesting question to know whether the *intaglios* were built subsequently to the *relievos* or *vice versa*, but there seems to be no criterion at present by which the riddle can be guessed. If, however, at some future time, an intaglio should be discovered across which a leg, tail or wing of a relievo should be carried, thus filling part of its hollow; or, on the other hand, one whose excavation is continuous through any part of a raised mound, the relative priority would then be unmistakably obvious—at least as regard the specimens found.—*The American Antiquarian.*



GROUP OF EFFIGIES NEAR FORT ATKINSON WISCONSIN.

The Economy of Gas or Electricity for Illumination.

Dr. R. A. Witthaus, who conducts the chemical department of *The Engineering Magazine*, writes: It is curious to note the controversies regarding the relative value of the electric light and of manufactured gas for illuminating purposes which appear in each issue of the journals devoted to these respective industries. But while such controversy is necessarily futile in itself, undoubtedly it is productive of good results on both sides, resulting in the study of shortcomings and, where possible, in the remedy of the same. In Indianapolis the other day the current from a trolley wire went wandering and descended the hollow iron supporting pole until it made contact with a "dead" gas main. After burning a hole in this, it continued on along the dead main until it reached a point where this crossed a main carrying gas, and here burned a second hole. The gas now escaped through into the dead main, and finally, passing up the pole, was set on fire, the wires were burned and traffic stopped. On the one hand, of course, this is proof that such a dangerous commodity as gas should not be allowed on the main thoroughfares, while on the other hand it clearly shows that the pressure of a powerful current of the electric fluid is a constant menace to human life. We do not intend to argue whether it was the match or the gunpowder which did the damage, but merely to speak of the relations of these too frequent accidents to chemistry, over that bridge between chemistry and electricity, namely, electrolysis.

A CURIOUS TREE GROWTH.

To the Editor of the Scientific American:

The beautiful picture which appears in the issue of May 13 of the SCIENTIFIC AMERICAN, showing a remarkable tree growth at Saratoga, leads me to send you a photograph of one of these "freaks," which seems quite as curious.

A CURIOUS TREE GROWTH.

The trees are in a piece of wild woods on the side of Mount Meenahga, near Ellenville, N. Y. They are beech trees. The one at the left makes nearly a right angle at about seven feet from the ground, and at a distance of three feet enters the side of the other and larger tree. The bark is perfectly smooth all around, and the junction resembles the springing of a natural branch. There are other oddly contorted trees near, one of which appears in the photograph.

Another pair is composed of a hemlock and an oak, perfectly joined at the height of about ten feet.

E. E. S.

The Largest Cave.

Under the dome of the Horticultural building at the Chicago Exposition there is an exhibit that will direct the steps of many tourists to North Dakota. There are several underground rooms decorated with stalactites and stalagmites taken from the great cave discovered in the Black Hills region. This cave is 52 miles long, and nearly 1,500 rooms, some of them 200 feet high, have been opened. There are streams, waterfalls, and 37 lakes, one of which is an acre in extent. The cave is 6,000 feet above sea level and 400 feet below the earth's surface. Petrified bones, snakes, and wood are taken from it. The theory is that these pieces of wood were washed in through the opening. A piece of pitch pine was placed in the water three years ago, and now it is shown in a petrified state.

The *Northern Lumberman* suggests the exhibit is an advertisement which will attract many to visit the natural cave.

NEW YORK HARBOR IMPROVEMENT MODELS AT THE COLUMBIAN EXPOSITION.

Visitors entering the United States government building from the western entrance facing the lagoon, will find the exhibit of the Corps of Engineers of the War Department, consisting of representations of the work done at the mouth of the Mississippi River; of the harbor at Key West, Fla.; Iron Pier at Lewes, Del.; Delaware Breakwater, and models showing the improvement of New York Harbor.

These latter delineate as a whole an engineering achievement of the first rank, and are as perfect specimens of technical work as can be found.

These models have been constructed under supervision of Lieut.-Col. George L. Gillespie, who is in charge of the work they represent, and to whom and his assistants, Mr. J. Paul Mayer, Mr. Harrington, and others, we are indebted for the opportunity of inspection and also for information concerning the same.

The approach to New York City at the entrance of New York Harbor, near Sandy Hook, is controlled by a narrow neck of shifting sand that is continually yielding its substance to the waves of the Atlantic that break upon its exposed shore. To preserve this shore from sea erosion a heavy riprap wall with groins extending from high to low water mark has been built. This, with the various buildings, roads, varying surface of the land and depth of water is shown with minutest fidelity. In our engraving, No. 1 shows location of the bell tower, 2 the Hook beacon, 3 Maritime Exchange signal tower, 4 telegraph station. The model showing Hell Gate (the narrow passage to New York City from Long Island Sound) before improvement gives an accurate idea of that once-dreaded stretch of water, and we can easily imagine the feelings of the early navigators as they were whirled through on the boiling water between rocks that threatened to destroy them on every hand. Before the advent of the first Sound steamer (built by Fulton), trade was carried on by swift sailing packets that left New York so as to pass through Hell Gate with the last of the flood tide. After the successful voyage of the first steamer a regular time for departure was established and it was triumphantly announced that Hell Gate had been robbed of its terrors by steam.

In order to compete with steam the sailing vessels had to risk the passage regularly, and consequently more lives and property were lost after the application of steam than before in running the gauntlet of these obstructions.

In referring to the engraving, No. 1 represents the northern end of Blackwell's Island; 2, Bread and Cheese; 3, Flood Rock; 4, Gridiron and Hen and Chickens; 5, Negro Heads; 6, Little, and 7, Great Mill Rocks; 8, Heel Tap; 9, Rhinelander's Reef; 10, Hallett's Point; 11, Frying Pan; 12, Hog's Back; 13, Holmes' Rock; 14, Pot Rock; 15, Way's Reef; 16, Mussel Shell.

The great increase of traffic after steam was applied to the navigation of Long Island Sound in 1817 called for recognition of its rights to a diminution of the dangers of this waterway, and in 1848 Lieutenants Davis and Porter recommended to Congress the destruction and removal of Pot Rock and Way's Reef, and in 1852 Major Fraser, using Mailiefert's system of submarine surface blasting, began operations.

In 1867 General Newton examined Hell Gate and recommended for the removal of isolated reefs the construction of a cupola scow. This was built the next year and had a well hole 32 feet in diameter and was provided with 21 drills.

It was used on Diamond Reef in 1869, Coenties Reef in 1871, and the Frying Pan in 1872.

The East River makes a right angle at Hallett's Point, Astoria, and another at Negro Point, Ward's Island, and work was begun in August, 1869, to remove the reef at the former point.

A detailed survey made in 1871 of the surface of the reef consisted of the location of 10,000 soundings. By this means the engineers were enabled to regulate the length and height of the headings that radiated from a shaft protected at the top by a cofferdam.

These operations were continued until September 24, 1876, when 52,000 lb. of explosives rent the pillars and roof of the mine.

The rock thus broken up was removed by dredges, and vessels could thus pass 150 feet nearer the shore. The greatest engineering work, involving the destruction of Flood Rock and the minor reefs connected with it, was completed October 10, 1885.

On that day 150 tons of dynamite and rackarock lifted into the air a column of water 1,200 feet long, 700 feet wide, and 200 feet high. A model of part of Flood Rock is shown in our illustration.

It is so constructed that the roof can be raised so as to show the galleries and headings and system of exploding the mine.

This roof in the original of the model was of an average thickness of 15 feet and an area of about 9 acres. It was supported by 476 columns, and the depth of the shaft was 64 feet.

The mine at Hallett's Point was exploded by a system of quick-burning fuses; every cartridge being connected in a series, which was in turn connected with another. In Flood Rock, however, the greater number of cartridges were inserted in the holes, which were then plugged up.

Beams were placed across the main passages from corner to corner of the pillars and connected; and the explosion of these caused that of those embedded in the walls by sympathy.

For eight years dredges have been at work removing the debris caused by this explosion and a depth of 22 feet of water has now been reached. When there is an even channel of 26 feet, the work of dredging will be discontinued. The work of demolition was so thoroughly done by the explosion of 1885 that only occasional blasting is now necessary in order to forward the work of clearing the channel. One of the models shows the appearance of the rock, above the surface before the work was commenced.

There is now a depth of water of 26 feet over all the other obstructions except the Bread and Cheese, which is now inclosed by a sea wall, Hog's Back and Holmes' Rock and Great and Little Mill rocks, which are united by a causeway.

Another extensive work shown by the models is the Harlem River improvement, which consists of the deepening of the channel of Spuyten Duyvil Creek and the Harlem River and the removal of the rocky divide which separates them just below the village of Kingsbridge. This model is remarkable for the completeness and fine execution of details, the tracks of the railroads, drawbridges, signal stations, etc. The depth of the creek and of the cut are presented with exactness, and that part which shows the rock removed from the cut can be lifted out.

These models are carved in wood from the plottings taken by the engineers, and reduced to the different horizontal and vertical scales, each point being verified by reference.

A gelatine mould is then made from which plaster casts are taken, and the parts colored in accordance with the rules of engineering technique.

Where Tin Comes From.

The United States consul at Singapore says that more than one-half the world's tin is mined in the Straits Settlements. The output for the year 1891 was 57,551 tons, against 36,061 tons for the Straits Settlements. If to this 36,061 be added the 12,106 tons, the output of the Netherlands India, whose tin-bearing islands are within a few hours' steam of Singapore, it will leave but 9,384 tons for the rest of the world. Up to the introduction of modern tin mining and smelting machinery in 1889, the tin was worked for a century in a most primitive fashion by the Malays. They simply dug down at the base of a hill, took up the clay which contained the *biji timah* (small nodules), and carefully washed it in running water. When dry, it was smelted in a furnace built of clay between two layers of charcoal, the fire being forced into a glow by means of bamboo bellows. When the metal became molten, it trickled through a hole in the bottom of the furnace into a vessel, from which it was ladled into moulds, forming slabs weighing about 2 catties (2⅔ pounds). A rajah's or chief's wealth was reckoned in bars or slabs of tin. The primitive tin mining of the Malays gave place to the more energetic and thrifty mining of the Chinese, who brought with them better tools and better business methods. The Chinese monopolized the entire field, until the formation of the Jelebu Company, in 1889, with which the Chinaman can still compete.

The Chinaman's manner of working is simple, though thorough. As the float tin lies at a distance of from twenty to fifty feet from the surface, gradually diminishing toward the hill sides, where it is not more than six feet, the jungle is cleared along its source, and water is brought by a ditch from the nearest stream. At about six feet down, the water begins to rise from the soil, and to get rid of this, and also to utilize the water from the stream as a motive power, an ingenious chain pump is made by constructing a long wooden trough of three planks, each 100 feet in length, and this is placed with one end resting on the bank, the other sloping to the water in the lowest part of the mine. A wooden chain, with its small oblong pieces of wood placed at right angles to the line, is fitted accurately into the trough. The wooden chain is endless, and is passed round two wheels, a small one at the lower end of the trough and a large one at the upper end. The latter is a water wheel, and is turned by a constant stream of flowing water. Round the axle of this wheel are cogs, each of which, in turn, as the wheel revolves, draws up a link of the endless chain through the trough, and, as each joint fits accurately into the trough, they bring up in succession a quantity of water, which on reaching the mouth of the trough falls into the channel by which the water which turns the wheel is carried off, and is thus also taken away out of the mine and conducted to the next, when the process is repeated. The small wheel at the lower end of the trough regulates the chain and guides the wooden joints into the trough.

The Chinaman's tools consist of a hoe, two baskets, and a bamboo pole. The soil is scraped with the hoe into the baskets, which in turn are balanced over his shoulders at the ends of the bamboo pole. The washing is performed in much the same way as placer gold is washed in California and the West. The soil is thrown into a trough filled with running water, in which the dust is carried off in solution, and the ore retained by means of wooden bars nailed across the bottom of the trough. While the Chinese system of smelting is similar to that of the Malays, it is more elaborate, and carried out on a much larger scale. In place of the bamboo bellows, a very ingenious plan is adopted. The trunk of a tree, about 18 inches in diameter and 10 feet long, is carefully hollowed out and closed at either end. A long pole, with a circular piece of wood at one end, fitting exactly into the bore of the tube, acts as a piston. In order to secure the tube being perfectly air-tight, the end of the piston is well padded. Valves are placed at each end, to allow the air to enter, and the center of the nozzle of the bellows communicates with the furnace by means of a small air passage. On the piston being drawn out, the air in the higher portion of the tube is forced down the nozzle, and being drawn back, the air in the further part of the tube is similarly drawn into the furnace. The charcoal is soon brought to a white heat, and ready for the moulds. The best of the Chinese mines are found in Laroot, in the northern part of Perak, south of the Siamese State of Quebrada, in a stratum of whitish clay. In some of the tin mines in the neighborhood of the Batang and Padang rivers, small quantities of gold are found mixed with tin.

Consul Wildman says that the Jelebu Tin Mining and Trading Company is the only successful European-managed mining adventure in Malaya, and one of the chief producers of Straits tin.

Fall of an Aerolite.

The Spokane *Review* (Washington) of June 2 contains an interesting letter from Engineer's Camp, on Beaver Creek, B. C., which states that on May 26 last a mereoric stone, or aerolite, exploded in that vicinity, the fragments falling along Beaver Creek, about ten miles above its junction with the Columbia River. At about 4 P. M. on that day there occurred fifteen or twenty short, sharp reports following each other in quick succession. The first report was the loudest, but all were clear and distinct. The noise was heard at Sayward, Waneta, and even at Northport, nearly twenty-five miles away. A party of engineers surveying on the Nelson & Fort Sheppard railway were working in the vicinity. At first they thought the noise was thunder or a railroad blast, but there was no blasting being done within six or seven miles. Following the reports a whizzing sound was heard as if made by some body moving swiftly through the air. They were working in thick, heavy timber, and therefore could see nothing, and no fragments fell close enough to be heard strike the ground. At the time of the explosion a man named J. W. Gerling was walking along the trail up Beaver Creek. He heard it, but at first supposed it to be thunder. A few moments later he heard the whizzing sound above mentioned, and as he looked up to see whence it came, it grew louder and louder, until a stone struck the ground not far from where he was standing. He searched for it a few minutes, but the bushes were so thick he could not find it, and the fragment evidently was small. Ed McLeod, who is building the "tote" road for Contractors Peter Larson & Co., says that the report seemed to come out of the sky almost directly above the place where he was working. A fragment fell within fifty feet of him, and although it buried itself in the earth, he succeeded in finding and digging it out. The specimen would weigh four or five pounds. One or two other fragments were observed to fall and two laborers were very nearly struck by one piece. On the following day Mr. James Hislop, of the engineer corps, was taking topography near where Ed McLeod found his specimen, and while so doing came upon a hole in the earth about the size of a badger hole, and evidently freshly made, as loose earth had fallen back in it. The hole was at about an angle of sixty or seventy degrees. Together with Mr. E. L. McNair and Otto Austin, also of the engineer corps, they made an excavation and at a depth of about three feet came upon a rock weighing about twenty-five pounds, which was exactly similar to the piece found by Ed McLeod. It was taken to camp and is now in Mr. Hislop's possession, who values it highly. Other fragments, and probably larger ones. fell, but as they scattered three or four miles apart, and the country is mountainous and thickly timbered, there is little chance that any more will be found.

Naphthalene as a Timber Preservative.

Naphthalene, which is a product of coal tar distillation, in appearance something like paraffin, has been found useful in England for the preservation of timber. The wood is soaked for two to twelve hours in the melted naphthalene at a temperature of about 200 degrees Fahrenheit.

Composition Paint.

This refers to a composition paint which will not corrode when subjected to the action of water and further renders the material coated waterproof. The paint consists of:

Spirits of wine	1	gallon.
Shellac	4	pounds.
Resin	1	pound.
Steatite	½	pound.
Lampblack	2	pounds.

Instead of lampblack, any other desirable pigment may be employed. The ingredients are thoroughly mixed together, and for 30 minutes subjected to a heat of 212° Fah., and then allowed to stand for 48 hours. The mass is subsequently strained and ground in an ordinary paint mill.

The Pennsylvania Company's New Station at Philadelphia.

At this station, an engineering work of considerable interest is now being carried out by Mr. Percival Roberts, of the Pencoyd Iron Works. At present the station platforms are covered by two arched roofs of moderate spans, but a short time ago the company decided that the width of the station should be increased and placed under one roof, the width of which will be 307 feet clear, a dimension exceeded only by two other famous structures—the Machinery hall in Paris and the Manufactures building at Chicago. It was a matter of necessity that this alteration should be carried out without interfering with the constant traffic of the station, and accordingly the great span is being erected over, and clear of, the existing roofs, which will be removed after the completion of the new structure. In design the new roof will resemble very closely that of the Jersey City station. Large areas of glass in exposed situations, and at a great height above the ground, are a constant source of expense for maintenance, and what is much more serious, a standing danger to the people on the platform beneath. These dangers have been practically obviated by the use of glass moulded upon round steel wire netting. The netting is embedded in the glass, so that fracture becomes practically impossible, and in any case must be limited to very small areas, and no broken glass can fall to the ground. This new glazing material can be bent, and in this way curved skylights can readily be made. The method of making this wire-strengthened glass was illustrated in the SCIENTIFIC AMERICAN of Nov. 5, 1892.

JAPANESE AT THE WORLD'S COLUMBIAN EXPOSITION.

One of the most picturesque parts of the Exposition on opening day, says *L'Illustration*, was the Japanese section, before which the exhibitors had grouped themselves, offering a picture that was truly characteristic of this race, which is gradually becoming Europeanized. Some have adopted modern garments, while others, who are more timid, retain a part of their national costume, but wear shoes instead of slippers, and have English caps on their heads.

REFRACTION AND DISPERSION OF LIGHT.*

Fill an ordinary drinking glass, having a plane bottom, one-third full of water and incline it, as shown in the engraving, so that the water forms a prism. This permits the observation of the phenomena of refrac-

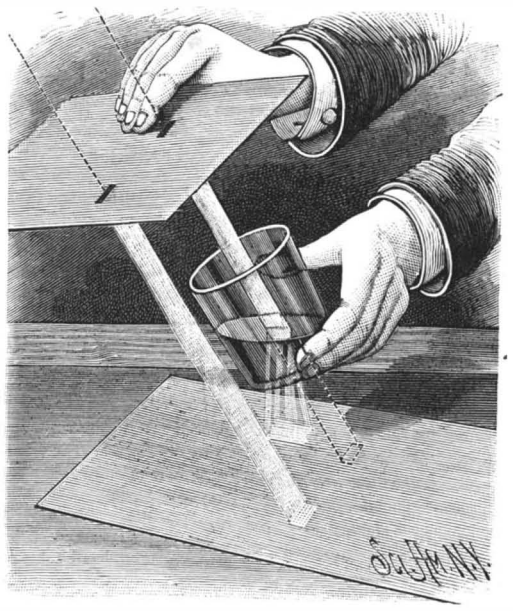


Fig. 1.—REFRACTION AND DISPERSION.

tion and dispersion of light. The experiment may be performed in the sunlight or by means of a lamp in a darkened room. In the first case, a card, having two slits made in the same line, is held over the glass and the glass is inclined so that the rays of the sun pass through it parallel to its axis. The card is held parallel with the top of the glass containing the water. Through one slit the light is allowed to fall on the

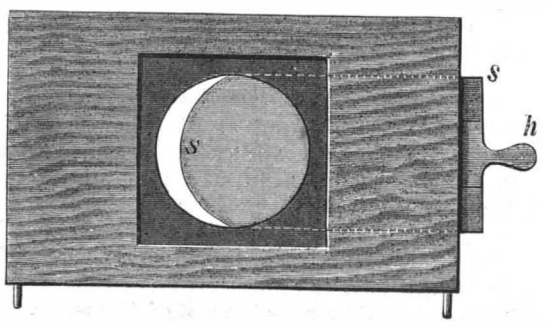


Fig. 2.—SLIDE ILLUSTRATING IRRADIATION.

water in the glass, and through the other upon a piece of white paper placed under the glass. The beam is seen diverted from its course, and upon the paper is seen the spectrum.

The pencil of rays emerging from the glass is thus seen diverted from the path of the incident beam and also dispersed.

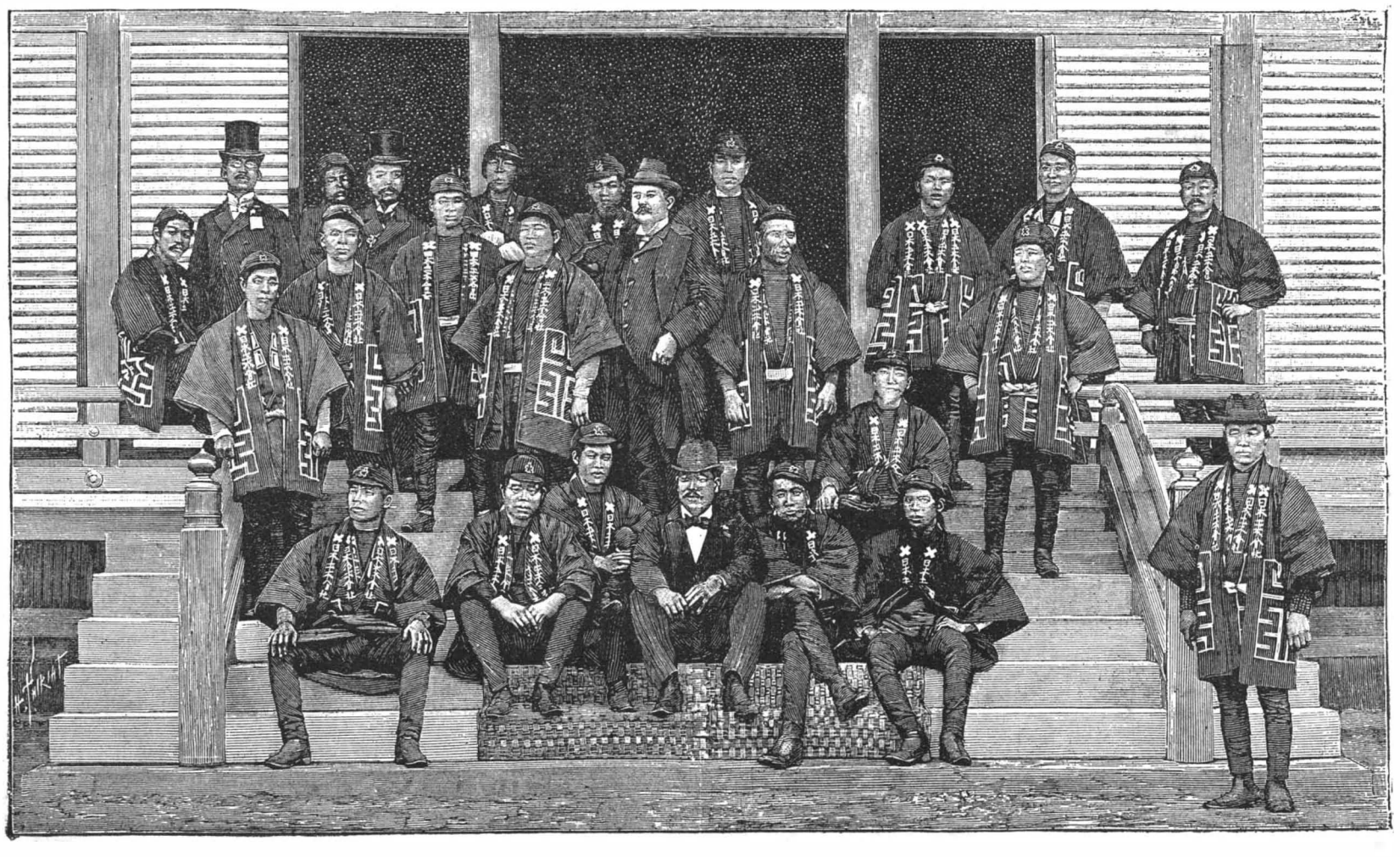
Irradiation.—This phenomenon, which is frequently noticed in observing the new moon, may be demonstrated experimentally by the apparatus shown in Fig. 2. The frame, which is fitted to an optical lantern, carries an opaque plate having a circular opening, before which a slide, *s*, of ground glass or paper, is placed. If this slide is opened only a little way, the outer border of the half crescent appears to be formed on a larger circle than that of the dark part.

Engraving Glass by Electricity.—The glass plate to be engraved is covered over with a concentrated solution of saltpeter and connected with one pole of a battery. A fine platinum point is connected with the other pole. This point serves as a drawing pencil, and the lines traced by it will be found etched in the surface of the glass.

* From the German translation of "Experimental Science."

Photography as an Aid to Art.

At the meeting for the distribution of prizes to the students of the Art Training School, South Kensington, an address was delivered by Mr. W. F. Yeames, R.A. He pointed out that the standard of work required from artists was getting higher every day, the competition, owing to the increase of their number, being also very much greater. Students must always bear in mind that the instruction received in schools was always technical only, and that they were but on the threshold of art when they left the school, and must depend for success upon their individuality. When they entered into their work in the field of art they would come under many influences, and it was on one of these he wished to dwell, that of photography. Photography had done a great deal, especially for art. In one branch it had been an enormous help in the reproduction of the works of fine art throughout the world. Photography was a feature of the age of science and mechanical appliances, and, like all things scientific, dealt in facts. In no photograph did one see any expression of the emotions of the heart; but these were qualities which they, as artists, would have to deal with. In a broad way he would say the art of drawing had improved under the influence of photography, but he would make a slight exception as regards the rendering of human form and face by the great masters. He could not say that photography had excelled the productions of these great men, who had such a keen perception of everything in nature that they were able to produce results that photography had never surpassed. But with nature in general, vegetable life, clouds, etc., photography had brought to light many things not known before. With reference to when and how students should use photography, he said the artist could use it with impunity when his knowledge enabled him to do without its services: that is, a man should be master of photography, and not photography master of the man. Before using it he should be so well grounded in the technique of drawing as to be able to draw any object in nature; photography would then be of much use to him, as it would lighten his labor and extend the range of his subjects. Photography should be used only as an aid to art work.



JAPANESE AT THE WORLD'S COLUMBIAN EXPOSITION.

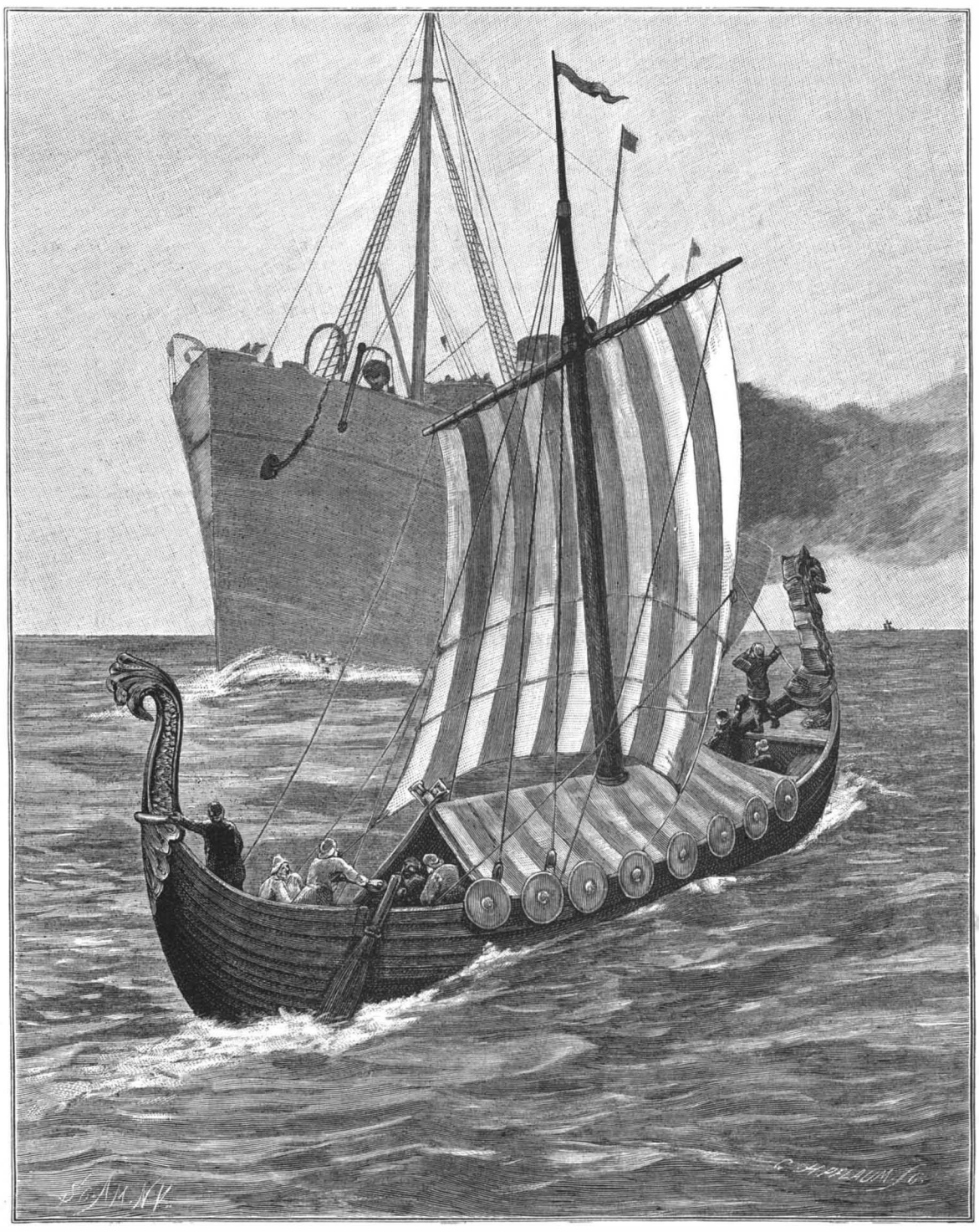
THE VIKING SHIP FOR THE COLUMBIAN EXPOSITION.

The Viking ship, a reproduction of the famous Gokstad find, has reached our shores, after a successful voyage. The trip goes to show how the ocean may have been successfully traversed by such a craft under sail power, and is a corroboration of the possibility of the discovery of America by Leif Erikson. Our cut shows the general appearance of the little craft as she might be seen in midocean speaking a great liner. Seventy-eight feet long, sixteen feet wide, and drawing but four feet of water, she is but a little larger than the long boat for a modern five hundred foot leviathan. In the background of the picture, the bow of a modern ship is seen towering far above the picturesque little cockle shell that, unassisted, has made her way across the Atlantic Ocean.

On April 30 the Viking ship left Bergen, Norway. At 3 o'clock on the morning of May 27 the east coast of Newfoundland was sighted. On May 29 Cape Race was passed. On June 13, at 4 P. M., the port of New London was made, the first American harbor the ship entered. The voyage was highly successful, and went to prove the excellence of the ship's model.

In one severe gale, the ship lay to for eight hours, with a drag or sea anchor out. She rode well, but shipped a little water forward. A second gale was encountered, in which, under close-reefed foresail, the ship successfully scudded before the wind.

The ship and her master and crew have been made the objects of well merited ovation, and her progress to Chicago will be a march of triumph in every sense. The Gokstad ship from which she was built is fully described and illustrated in our SUPPLEMENT, Nos. 241 and 251.



THE WORLD'S COLUMBIAN EXPOSITION—THE VIKING SHIP RECENTLY ARRIVED FROM NORWAY.

The Blistering of Paint.

Unless caused accidentally by the action of heat, or naturally by the sun's rays, helped along by pitch or oil in the wood, we may conclude that the blistering of paint is due to the presence of moisture in the wood which was either there when the paint was put on or has got there since by leaks, letting the water into the back of the wood, soaking it, and so forcing the paint to let go its hold.

In house painting, much of this occurs from too much haste in painting unseasoned spruce clapboards; or in painting them in the early morning after a very heavy dew has fallen on a hot summer's evening and before the sun has had time to dry them off. The grass about the building is wet; you could not walk through it scarcely without wetting your feet; and why should not, with some movement of the atmosphere, the sides of your newly clapboarded building be wet also? They are; and though barely perceptible to the feeling of the palm of your hand, nevertheless, those clapboards, like a sponge, have absorbed a considerable amount of moisture, which can but have a deleterious effect upon your paint that you have put on before it has had time to dry out. New spruce clapboards should also stand a fortnight or so after being put on, exposed to sunshine and storm so as to get well "tanned up" by the weather, and the grain opened so as to admit well the penetrating qualities of the paint; and, if dry when painted, your paint will stay there, if good for anything and decently applied. Of course, it is understood that time enough must be given after a storm to have the work thoroughly dry before paint is put on, and this is usually done; but the other conditions above named are not always observed, and as a consequence, somebody's paint is condemned when it is not to be blamed, but the one who used it is the guilty party. I know of three double tenement two and one-half story new houses that were painted in this city recently, two of them with a well-known and popular brand of ready-mixed paint and the other with lead and oil, all of which blistered more or less, and the ready-mixed paint agent had to stand the cost of repainting his two houses because he guaranteed the paint not to peel, though it was no worse than the other one painted with lead and oil, and the contractor acknowledged the paint could not be at fault. Doubtless the trouble lay in one of the causes I have named and too much haste to get the paint on. When will the avaricious painter ever learn that "haste makes waste," and take time to do work as it ought to be done?

Then, again, a poor brushman is the cause of leakage in nail holes and around joints; he does not fill all these places with paint as he goes along, so as to exclude the water that is sure to soak in later on. Here you may observe the difference between a good and a poor workman; the former wipes his brush into all cracks, crevices, holes, and cross grained places in his work as he goes along, not only making it look much better, but rendering it impervious to moisture, while all the poor hand seems to think necessary is to smutch over the work so as to give it the appearance of having been done over with the same color! Thoroughness and appearances are vastly different matters.

Finally, if the painter's attention has been called to some of his work which has blistered, let him prick the blisters, and if water runs out of them, he may rest assured that there is a leak somewhere, letting the water in on the back of his work; and it is only a question of searching until he finds it. It may be a leaky roof, which only much painstaking will locate the spot in. Underneath the projecting "visors" over the platforms of passenger cars I have known much of this trouble to be caused by a leak in a tin roof which has rusted through in a small spot hardly perceptible, by cinders soaked with water lying along beside the water cans. The painter will be blamed until he takes the trouble to get a ladder and begin the inquest. The new steam heat from the locomotive, lately adopted on most roads, when discharged under the cars at terminal points, will cause paint to blister and peel from those panels on each side of the car about midway and opposite the let-off valves; not because the steam is hot enough to do this, but because of the moisture from the vapor that is continually arising and soaking into the ends of the panels and behind and around them. In fact, I have seen cars completely enveloped in the clouds of steam which were discharged from the train while standing still, which ought not to be done, but rather should be let off before the terminus is reached, while the train is in rapid motion.

No matter how righteous a paint may be, or however well put on, if the wood gets water-logged, it will blister and let go. Good paint and water have no affinity for each other; water is the third party which will cause a separation between paint and wood, however well married they have been.—*By Charles E. Copp, in the Painters' Magazine.*

Testing 100 Pound Rails.

The New York, New Haven & Hartford Railroad has ordered from the Maryland Steel Co. 15,000 tons of 100 pound rails for use during this year. The chemical composition of these rails is left to the judgment of the makers, except that it is to be made of as high carbon as they are willing to make and still meet the requirements of Section 8 of the specifications, which reads as follows: While the heat is being cast two ingots shall be made. The first from steel going into the first regular ingot, the other representing the last one. These test ingots shall be 3 × 3 inches and not less than 4 inches long. From them bars at least ½ inch square shall be drawn at one heat. Each bar when cold shall be bent without breaking by the blows of a sledge to not less than a right angle. Should one bar from a heat fail and the other stand the test, a third bar may be taken from a bloom rolled from the same ingot represented by the failed one. If this stand the test, it shall be accepted in lieu of the failed bar. If the maker choose, more than two test ingots may be taken, but they must be from the steel of the first and last regular ingots. If this is done, and a test bar fail, another may be drawn from the duplicate ingot and tested, and if it stands accepted. A rail butt from each conversion shall be placed either head or base upward on solid steel or iron supports, the distance apart of which in the clear shall be 4 feet, and upon them shall be dropped a weight of 2,000 pounds falling freely from a height of 16 feet for under 100 pound and 20 feet for 100 pound rail. Should a test fail to stand the drop without breaking, a second one may be made. If it also fails, all rails made from that heat shall be rejected, but if the second test stands, then a third shall be made. If this is successful, the rails of that conversion shall be accepted.—*American Manufacturer.*

A Fever Annunciator.

The *Lancet's* Paris correspondent tells of an apparatus of recent invention for registering rises of temperature from friction in a machine, from fermentation in a mass of grain, etc. A small metallic bulb half filled with ether is sealed by a corrugated cover. When the temperature rises so as to expand the ether vapor sufficiently, the cover is straightened out by the pressure and made to close an electric circuit that works a bell. It is said that the inventor, M. Tavernier, cherishes the project of fitting up hospital wards with these bulbs, each of which, secured in a patient's axilla, shall operate a numbered bell in the interne's room, after the manner of hotel annunciators. By this means it is expected a sudden and dangerous rise of temperature in any particular case may at once be brought to the interne's notice.

RECENTLY PATENTED INVENTIONS.

Engineering.

LOCOMOTIVE DRIVING GEAR.—David S. Patterson, North Platte, Neb. This invention provides for a front and a rear cylinder arranged on opposite sides of the driving wheel and connected by their pitmen with crank pins on opposite sides of the center of the driving wheel, the improvement forming a driving gear of simple and durable construction, designed to prevent horizontal straining of the axle journals and pounding of the wheels on the rails, whether caused by the centrifugal force of a single main connecting rod, a single parallel rod, or a single crank pin, or by the angular thrust of the main connecting rod.

ENGINE GREASE ARRESTER. — Jeremiah F. Traver, Newburg, N. Y. The oil, grease, and other impurities with which the steam becomes charged in passing through the engine to the condenser are effectively separated from the water of condensation, according to this improvement, in a novel form of filter box, the water of condensation being returned to the boiler comparatively pure. A pipe valve is adapted to be seated on the outlet pipe of the filter box, the valve being actuated by a float and extending from its seat to a point above the highest level of the water in the filter box, whereby only the lower, pure strata of water can be drawn off by the pump, the impurities being held for removal when a sufficient quantity has accumulated.

Railway Appliances.

CAR COUPLING.—Joseph Zehneck, Magdeburg, Germany. This is a device especially adapted to the form of car coupling employed on the German state railways. Combined in the coupling is a drawhead having a hooked outer end, a rock shaft on which is a yoke pivotally connected with a link, with means for throwing the shaft, while a frame pivoted to rock vertically has an operating lever, the frame carrying arms diverging from each other and extending across the hooked end of the drawhead.

CAR COUPLING.—Lemuel S. Manning, Alessandro, Cal. In this device a cylindrical drawhead is employed, spring cushioned against percussion and draught strain, conically recessed at its front and provided with a pivoted latch block adapted to interlock with an elongated slotted link. The coupling link has a conical recess at its front end, the link body having nearly parallel side walls, with top and bottom walls tapered toward each end from the center of length, and similarly slotted near each end to receive the tongue of a latch block in the conically recessed drawhead. The device is adapted to couple automatically with another coupling of its class, and uncoupling may be readily effected from either side of the car.

METALLIC TIE.—Charles Worden, Rye, N. Y. The body of this tie is formed of a central arch and upwardly projecting side flanges, its shape being designed to insure great strength and at the same time permit of using comparatively thin sheet metal. Blocks resting upon the arch engage the flanges to prevent them from spreading, the blocks serving as supports upon which the rails rest. At or near the middle of the arch is a longitudinal opening through which packing material may be introduced to insure the stability of the tie on the track.

IMPROVED TRACK. — John Murnane, Coopersville, N. Y. To securely hold the rails so they cannot spread and prevent accidents from broken rails is the object of this invention. The rails are each provided with a casing made in two sections, formed in such a manner that each covers one half of the base of the rail, the web, and the under side of the base of the rail. The sections are held in place by bolts passing through at the web, where the sections are united together and secured to the rail. The rail so protected can be spiked to the ordinary wooden tie, but a sectional tie of special form and having curved flanges engaging the casing sections is preferably employed.

Electrical.

TIME SIGNAL. — Gerhard W. Van Vianen, Cologne, Germany. This invention relates to electric alarms for dwelling places, hotels, etc., permitting visitors, guests and others to set the alarms for any time in their own rooms, so that the occupants of rooms will not be dependent on the punctuality of servants or others. The apparatus is set in motion by a clock provided with specially constructed contact mechanism, there being placed in each room a plug contact apparatus provided with a bell which serves as an alarm, conducting wires connecting the clock with the different alarms.

WIRE COUPLING.—John Bodine, Pittsfield, Ill. To couple the ends of electric wires, or mend broken wires, so that the circuit will be as good as it was before the break, is provided for by this invention by means of a longitudinally bored coupling body, with two pivoted clamping dogs pivoted between their ends to the body and projecting at their inner ends into the bore, a spring-pressed plate bearing on the inner ends of both dogs. The ends of the wires are thus firmly bound in place in such way that the grip of the coupling is increased by increased tension on the wires.

TOWER WAGON. — Joseph S. Hill, Lafayette, Ind. This is a wagon to facilitate stringing trolley wires for electric railways and for putting up electric lines generally. It has an extensible tower and is provided with an insulating platform for supporting the wagon, there being also a reel for holding the line wire, sheaves for guiding it, and a brake controlling the reel, whereby any desired amount of tension may be given to the wire.

Mining.

MINER'S SAFETY LAMP. — Heinrich Hubner, Hermsdorf, Germany. This is a lamp in which the ignition of the wick is effected by the explosion of a percussion cap or the like, the invention also providing other novel features designed to insure safety, the construction being such that the chimney and the gauze cylinder may be readily connected and disconnected from the reservoir, while the accidental disconnection of the parts is guarded against.

COAL WEIGHING BASKET. — Simon Jones and Samuel B. Bishop, Hamilton, Ohio, and Thomas C. Dupont, Central City, Ky. This is a device for weighing coal in transit from the inclined screens or chutes to the railway car, the basket being of such construction as to permit the miner's quota of coal to be weighed at one operation, and yet separate this quantity while in the basket into different grades to be separately discharged into different cars or be loaded with the other coal which goes through the screen for which the miner is not paid.

Agricultural.

CULTIVATOR.—Joseph R. Finney, Randolph, Wis. The cultivation of corn and similar plants is especially the design of this machine, in which, when two rows of teeth are employed, either of the rows may be raised or lowered independently, or both elevated or depressed simultaneously, while the beams carrying the rows of teeth are so swiveled to the frame of the machine that when the latter is turned at the end of a row the cultivator does not injure the plants. The cultivator teeth are also of peculiar formation, and in their rear are located the teeth of hill coverers not adapted to enter the ground, but to travel quite close to it.

SEED POTATO CUTTER. — Isaac Dunn and William R. Dunn, Jr., New Brunswick, N. J. This is a device to facilitate the cutting of potatoes for seeding purposes without danger of bruising or injuring the eyes or skin of the potato. The box containing the potatoes has an opening to form a rest for the operator's arm, and a knife of special shape is secured to the end of a swinging arm, the latter being connected by a link with a treadle. The arrangement is such that a shearing cut is given to the potato, which may be very conveniently handled by the operator.

Miscellaneous.

ORGAN.—Jerzy Polukanis, Bloomfield, N. J. A rapid sounding of the organ pipes is designed to be obtained by the improvement made by this inventor, the performer being also enabled to easily manipulate the keys. A self-acting pneumatic valve is adapted to be actuated by the wind from the wind box, on releasing air from the valve by means of the keys or pedals, the valve being controlled by a preponderance of pressure from the wind box at the time the keys or pedals are actuated.

INKSTAND.—Phineas B. Myers, Brooklyn, N. Y. This is an inkstand provided with one or more racks so arranged that when a particular rack is pressed down, the cover of a corresponding ink well will be automatically opened, the covers of other ink reservoirs remaining closed, enabling a bookkeeper to keep a red ink pen upon a rack operating the lid of the red ink well, the black ink pen being placed on a similar rack for the black ink well, etc., thus preventing the frequently recurring mistake of dipping a pen into the wrong ink reservoir, and enabling the penman to work with perfect safety and dispatch.

GLOVE. — George M. Cluze, Paris, France. This is a new article of manufacture, consisting of a glove almost identical in appearance with the usual style, but having the thumb sewed to it in a particular manner, whereby the seam around the thumb is avoided, and the thumb is rendered yielding in its length, affording greater freedom for the movement of the hand. The seam by which the thumb is secured does not extend to the wristband, nor is it continued to the palm, so that the latter is left perfectly smooth, as in ordinary gloves.

ROLLER SKATE.—Carl Storla, Belford, South Dakota. This skate has a box-like frame containing compartments for holding steering mechanism, wrenches, and other articles, and means are provided for tying the skates together to form a vehicle for carrying the rider. The skates likewise have movable spring-pressed platforms held to move vertically within the box-like body, in connection with a ratchet mechanism for turning the wheels by the downward movement of the platforms, a tripping device automatically releasing the ratchet during the upward movement of the platforms, and the skates being operated by simply shifting the weight of the body from one skate to the other, whereby the skates may be made to run very rapidly.

WASHING MACHINE.—James H. Jones, Floyd, Texas. This device comprises a revoluble cylinder mounted in a casing, there being on the interior of the cylinder slats corresponding to the ribs of the washboard, while in connection therewith is arranged a series of buckets, so shaped as not to present sharp edges likely to injure the clothes, the buckets serving to carry up water and empty it upon the clothes as the cylinder is revolved by means of a crank. The clothes are thus tumbled about as the water is kept in a state of agitation, and the clothes are conveniently washed without a possibility of their being injured.

CONVERTIBLE STOOL.—Frank Graham and Irvine E. Curtis, Easton, Washington. This is a sectional stool which may be folded to incase an umbrella, the whole device being then adapted for use as a walking stick. It consists of an upper and lower series of braces hinged at their adjacent ends to swing outwardly, each brace having an outer hinged section to swing inwardly into a horizontal position, while an annular ring or cap connects the adjacent inner ends of each series of hinged sections. When the stool is folded an open-ended tube is formed to removably inclose an umbrella.

EGG HOLDER.—Abraham A. Anderson, New York City. Two patents have been granted this inventor for a device comprising a frame containing an egg cup or socket, a top ring fitting the upper end of the egg, and a horizontally swinging knife with a circular egg-receiving aperture, and a swinging cover plate also having an egg-receiving aperture, whereby an egg may be securely held and one end cut by the knife, which does not then interfere with the removal of the contents of the shell. The egg may be further cooked if desired, the egg and the holder being together placed in the water. The holder also affords facility for introducing condiments and stirring them within the egg shell. With the holder likewise an egg may be conveniently cooked at the table with an alcohol or other lamp.

POT OR KETTLE SCRAPER.—Peter Unsinger, Fremont, Ohio. This is a flexible scraper to facilitate removing grease and dirt from the sides, bottoms, and corners of pots, kettles, metallic sinks, etc. It consists of a thin steel blade with a handle formed in two parts, each part pivotally connected at its forward end to the blade, and the parts pivotally connected with each other at their rear ends. The scraper readily conforms to the outer surfaces of the pot or kettle, and may be readily introduced into the sharp corners to clean them.

COOKING STOVE.—Albert Loewenthal, Berlin, Germany. This is a portable or pocket stove, comprising a casing formed of two sections fitting one upon the other, each section being provided with a bowl-shaped cavity, the cavity of one section being adapted to receive spirits or alcohol when placed under the other section. The device is specially designed to serve the convenience of travelers, as it can be readily carried and easily set up for use in preparing, cooking, and warming coffee, cocoa, eggs, soup, etc.

BURNER FOR GAS STOVES.—Anton Weiskittel, Baltimore, Md. An annular cup or receiver has an open central air space, and its edges have outwardly flaring beveled surfaces forming a concave seat, in which rests by gravity an annular top having beveled surfaces and radial grooves, the latter serving to conduct off any liquid that may be spilled, and prevent its passing into the cup or receiving chamber of the burner. All separate fastening devices are dispensed with, and access may be readily had to every part for cleaning.

PUMP. — John W. Gregory, Garden City, Kansas. This pump has a displacing cylinder so constructed and arranged that the cylinder may be made of equal weight to the liquid which it displaces, thus reducing the power required to operate it, the relative weight and buoyancy of the displacing cylinder being conveniently adapted or adjusted to different depths of wells or heights to which the water is to be raised.

DESIGN FOR A FLAG.—John Terhune, Hackensack, N. J. This flag has on one side the insignia of Ferdinand and Isabella, and on the other representations of Columbus and his caravels, with characters simulating a page of his log book. The flag is swallow tail in shape, the Maltese cross of the insignia on one side being of comparatively large size.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

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Notes & Queries

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References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
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(5146) F. I. A. asks: 1. Would the microphone described in "Experimental Science" work well as a telephonic transmitter? A. Yes. 2. If so, would it make it better to substitute a diaphragm of tintype in the place of the wooden one? A. Yes; the diaphragm being not more than 2¼ or 2½ inches in diameter. 3. Which of the two motors described in SUPPLEMENT 641 and 759 respectively would give the most satisfaction? A. Probably the motor described in SUPPLEMENT 759 would prove satisfactory.

(5147) F. M. M. writes: In our gas field we have rock pressure of gas 135 lb. Our line pressure is about 125 lb. The question in dispute is this: We have a four inch pipe running from part of our field, say three miles, into the six inch pipe. Parties here claim by placing another three inch pipe alongside the four inch, we would gain pressure by it on the six inch line. We have now, understand, twenty-two miles of six, inch and three miles of four inch. I claim the pressure would be the same, that is, it would equalize on the six, and pressure be the same; but by placing a pump on said line to force from the end of six inch line to city would be far better, and use suction on the four inch line. A. The difference in pressure between the four inch pipe and the six inch pipe is no doubt due to friction. Any additional supply that you can make to the six inch pipe by an additional pipe will increase the flow and tend to equalize the pressure or raise the pressure in the six inch main. A pump will also overcome the difficulty, bnt in general, is expensive for gas transmission.

(5148) N. R. F. asks: 1. Why is it that the wheel of a radiometer always rotates with the white faces in advance when exposed to the sun? A. All radiometers do not turn the same way. At a certain degree of exhaustion the black surface moves toward the source of heat, while at a further degree of exhaustion the white surface moves toward the source of heat. The cause of rotation is supposed to be the difference in the degree of absorption and radiation of heat by surfaces of different colors. The dark surface being hottest repels the molecules of gas. If the gas is sufficiently rarefied the reaction due to such separation turns the vane. If the

gas is not sufficiently rarefied, convection currents are established, causing the blackened faces to approach the source of heat. There is also a degree of rarefaction at which there is a critical point in the conditions of molecular disturbance, when the radiometer ceases to move under the influence of heat. 2. How many people do you think will visit the World's Fair from opening day, May 1, to date of closing? A. Probably several million.

(5149) J. C. R. says: I have a well the water of which is full of Turbellarian worms, thus rendering it unfit for use. Could you suggest a means by which the well could be cleared of the worms? What is the cause of these worms being in the well? Is it on account of some impurity or do they exist in pure water? Please give me a receipt for cheap metallic roof paint which will stand the weather and will not wash off. I would prefer a dark brown. A. Thorough cleaning of the well is recommended. Then, if the worms still come in, put in a trout or frog. The worms probably burrow in the soil around the well and crawl through the curb and drop into the water accidentally. The best paint for roofs is red oxide of iron paint or Prince's metallic paint mixed with boiled linseed oil. Add a little lampblack to give it the required shade. Let the first coat dry well before second coat is put on. Use no turpentine.

(5150) E. A. P.—It is said the surface of tracing cloth may be restored by varnishing the cloth with Canada balsam dissolved in turpentine, to which may be added a few drops of castor oil, but do not add too much, or it will not dry.

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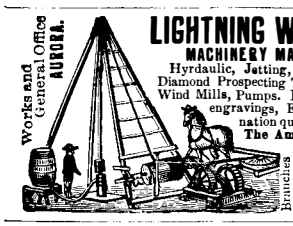

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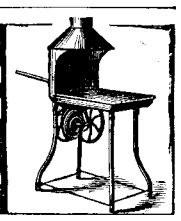

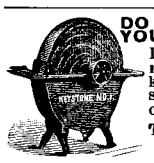

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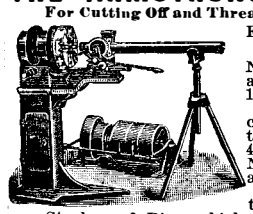

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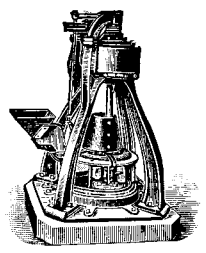

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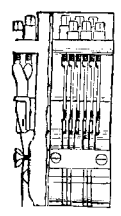

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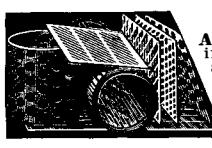

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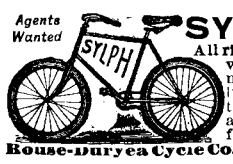

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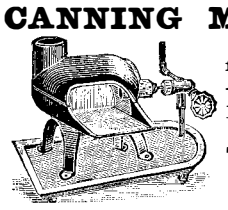

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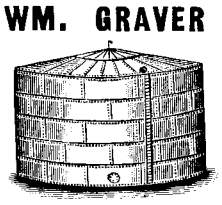

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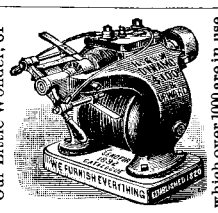

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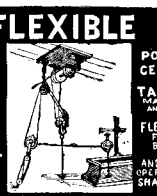

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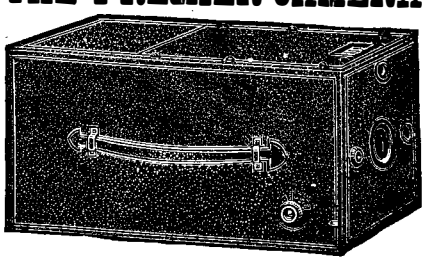

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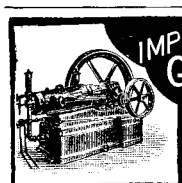

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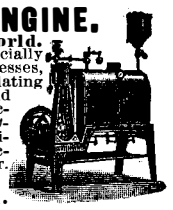

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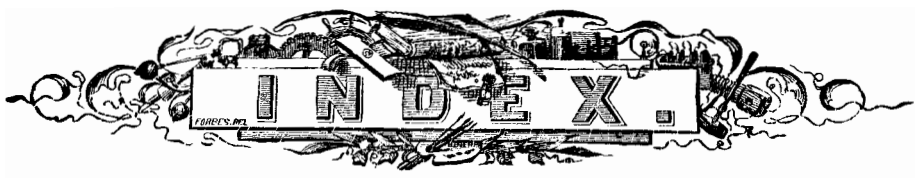

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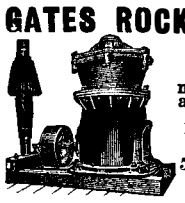

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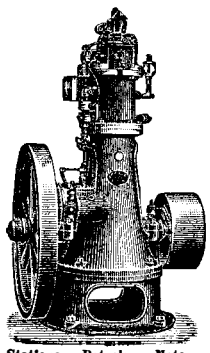

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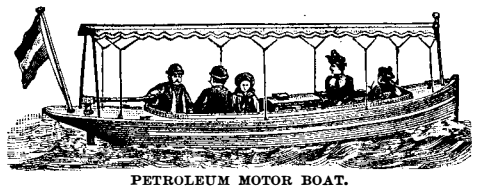

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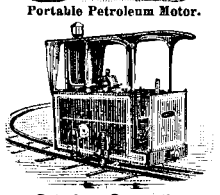

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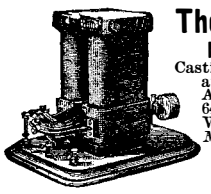

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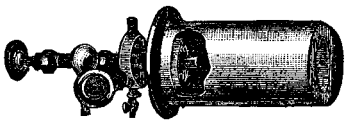

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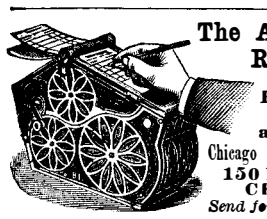

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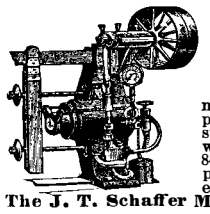

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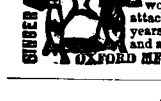

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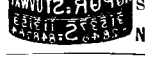

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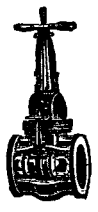

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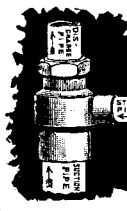
R. BOND, Colonial Secretary, St. John's, Newfoundland.—25th May, 1893.



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